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OFFER PRICE RANGE IN FINNISH INITIAL PUBLIC OFFERINGS

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Offer price range in Finnish initial public offerings

Objective of the study

The purpose of the study is to analyse the determinants of the width and the level of the initial offer price range in the Finnish IPOs. The determinants analysed are market conditions and firm and offering specific characteristics that are generally associated with uncertainty. The other objective is to investigate the efficiency of the IPO pricing process during the first stages of the IPO, which is done by analysing whether underwriters incorporate all information available to them to the initial offer price range and the final offer price, and by observing how accurately the initial offer price range predicts the final offer price and the market price of the share after the IPO. As there is no guidance in Finland regarding the width of the range, analysing the determinants of the range is more meaningful than in the earlier studies in the US, where the range width is based on SEC recommendations. The study also tests partial adjustment phenomenon in the Finnish IPO market with recent data.

Data and methodology

A sample of 45 Finnish IPOs between January 1, 1995 and December 31, 2006 where an initial offer price range is announced is used to study the subject statistically. The statistics relating to the width and the level of the offer price range in the sample IPOs are analysed to describe the characteristics of the ranges in Finland. Ordinary least squares linear regression analysis is conducted to test the impact of certain firm and offering specific characteristics and market conditions on the width of the offer price range, the price adjustment from the range midpoint to the final offer price, and initial returns. Information about the offerings has been collected mainly from prospectuses of the listed companies.

Results

There is no standard width of the offer price range in Finland, but the width varies significantly. The average percentage width of the range in the sample is 16.7%. In 89% of the sample IPOs, the final offer price remains within the offer price range, and it is set at the high value of the range in 40% of the IPOs. This finding indicates that the issuing firm commits to some extent to set the price within the range limits. Firm and offering specific factors or pre-IPO market conditions do not predict the width of the range very well, but they have some power in explaining the adjustment in the final offer price from the range midpoint. The midpoint of the range is a relatively accurate estimation of the final offer price and the first-day closing price, as the midpoint differs on average 9.4% from the final offer price and 19.3% from the first-day closing price. Underwriters do not incorporate all the information available to them to the final offer price, as price adjustments are positively related to initial returns, which implies that the partial adjustment phenomenon exists also in the Finnish IPO market.

Keywords

Initial Public Offering, Offer Price Range, Final Offer Price, Partial Adjustment, Initial Return

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1 Introduction

1.1 Offer price range in IPO pricing process

Pricing of initial public offerings has been a popular topic in the financial research during the past two decades. IPO pricing has proven to be difficult, as there is no earlier reference point that would indicate the market value of the company going public. Issuing firm's management does not know exactly what price the investors would be willing to pay for the shares in the offering even though the management has their perception of the correct share price. There are numerous studies and theories explaining underpricing of IPOs, but the first stage of the IPO pricing process, namely the setting of the initial offer price range, has received less attention in the earlier literature.

In the beginning of the IPO pricing process the issuing firm and the underwriters decide the initial offer price range that reflects the expected price for the offering and that is set out in the prospectus. The final offer price is usually decided after the book building process, where indications of interest are obtained from institutional investors. The final offer price is usually announced to the market in a stock exchange release shortly before the IPO occurs.

There are two aspects of the initial offer price range that the underwriter and the issuing firm have to decide. First, they have to decide the level (i.e. the midpoint) of the offer price range, which signals the price level that the issuer expects the investors to be willing to pay for shares in the issue. Furthermore, they have to decide the width of the offer price range, which determines how far from each other the high and low values of the range are.

In a recent Finnish IPO process that received a lot of attention the design company Iittala Group was about to go public during spring 2007. The initial offer price range was € 8.50 to € 10.50. The final offer price was set to € 9.50, but the listing was cancelled due to lack of investor interest. According to Iittala's CEO, the offering would have been easily oversubscribed if the offer price would have been set to € 9.00, which would still have been within the initial range and above the minimum price of the range, but the main shareholder insisted on a higher price. During the same week the health care company Suomen Terveystalo announced that the final offer price in their IPO is € 2.40, which was exactly at

the lower bound of the initial offer price range of € 2.40 - € 3.00. The unexpected turn in the Iittala IPO process raised the question why the initial offer price range in the Iittala IPO was set in the first place to a level that was not satisfactory to the main shareholder, and what is eventually the role of the initial range in the IPO procedure.

This paper analyses the determinants of the width and the level of the initial offer price range in Finnish initial public offerings.

1.2 Research question and objective of the study

The research question of this study is:

What are the determinants of the width and the level of the initial offer price range in Finnish IPOs?

The objectives of this study are the following:

- 1) To analyse the determinants of the width and the level of the initial offer price range in the Finnish IPO market. The determinants analysed are market conditions and firm and offering specific characteristics that are generally associated with uncertainty regarding the IPO value.
- 2) To analyse the efficiency of the IPO pricing process during the first stages of the IPO, which is done by testing whether underwriters incorporate all information available to them to the initial offer price range and the final offer price, and by observing how accurately the initial offer price range predicts the final offer price and the market price of the share after the IPO.

In this study it is assumed that both the width and the level of the initial offer price range are affected by factors indicating uncertainty relating to IPO values. Risky offerings are assumed to have wide ranges and large adjustments between the final offer price and the midpoint of the range, and vice versa.

1.3 Earlier studies

Even though there are several studies that have in some context discussed the initial offer price range, there are not that many focusing on it. The width of the range has been associated with and used as a proxy for the uncertainty regarding the IPO value in earlier studies (see e.g. Hanley, 1993 and Benveniste and Wilhelm, 1997). Hanley (1993) discovered that the wider the range, the greater is the change in the final offer price from the midpoint of the offer price range. Daily et al. (2005) studied with a sample of US IPOs the impact of several firm and offering characteristics that are generally associated with uncertainty regarding the IPO value on the width of the offer price range, but found no satisfactory evidence of the assumed relation. Jenkinson et al. (2006) noted that the guidance by Securities Exchange Commission (SEC) regarding the range widths has led to a clustering of range widths in the US, so the width of the offer price range is determined by convention rather than the uncertainty regarding the value of the IPO. This trend can explain the shortage of results obtained in the study by Daily et al. (2005). As there is no guidance in Finland regarding the width of the range, analysing the effect of the firm and offering specific factors on the range width in the Finnish context is meaningful and more likely to generate positive results than a respective analysis with data from the US.

The level of the range can be evaluated by comparing the midpoint of the range to the final offer price or to the price observed in the market. The revisions in the offer price with respect to the midpoint of the offer price range have been shown to be related to underpricing (see e.g. Hanley, 1993; Loughran and Ritter, 2002). Offerings where the offer price exceeds the high value of the initial offer price range incur higher initial returns. It indicates that the positive information learned after setting of the initial offer price range is not fully incorporated to the final offer price, which results in a higher level of underpricing. The phenomenon is generally referred to as partial adjustment. This thesis tests with recent Finnish data whether partial adjustment can be identified also in Finland.

There are many theories explaining the partial adjustment phenomenon. Benveniste and Spindt (1989) presented a dynamic information acquisition theory according to which the offer prices must be set low to reward the investors for revealing positive private information about the market demand during the book building process. Loughran and Ritter (2002) found that there is partial adjustment also to public information. They proposed a prospect theory

explanation to the partial adjustment, which is based on the assumption that issuers care about the change in their wealth rather than the level of wealth. Owners do not mind leaving money on the table as much when the post-market valuation of the company and thus their wealth after the IPO is higher than they expected.

Lowry and Schwert (2004) found that underwriters do not incorporate all market information available to the initial offer price range either, as price revisions from the range midpoint to the final offer price were found to be related to market returns prior to setting the offer price range. They also noted that firm and offering specific characteristics can explain price adjustment in a similar way than they predict underpricing. The findings and conclusions by Lowry and Schwert regarding the efficiency of the IPO pricing are tested with a more comprehensive set of predicting variables.

In addition, many of the studies and theories that explain underpricing, long-run performance or long term survival of IPO companies and that assume information asymmetry between the issuer and the investors are relevant also in the context of this study. The theories tested in this study include also for example venture capitalist certification theory (see e.g. Megginson and Weiss, 1991) and signalling theory (see e.g. Leland and Pyke, 1977).

1.4 Motives for the study

Given that setting the initial offer price range is the first stage of IPO pricing process, it is surprising that it has not gained more attention in academic literature. As the initial offer price range is not a binding indication of the price at which the shares are offered to investors, it has perhaps been considered as a less important stage in the IPO pricing. However, as noted by Jenkinson et al. (2006), the limits of the range are rarely exceeded in European IPOs, which indicates that the range has an impact on the final offer price and thus also on the initial returns for the investors. Therefore, both the level and the width of the initial offer price range have relevance in IPO pricing and hence, it is important to understand how the range is determined.

The IPO pricing related research has mostly focused on the difference between the final offer price and the market price observed after the IPO has occurred. There are no studies that

would have succeeded in explaining the determinants of the width of the range. A few researchers have studied the level of the range, but they have concentrated more on the relation between the adjustment in the offer price from the initial price range midpoint to the final offer price rather than the reasons for the price adjustment. This study aims at increasing the understanding of the determinants of the initial offer price range.

There is not very much recent research on the Finnish IPO market, which is partly due to the small size of the market. As book building process replaced to a large extent fixed price offerings in Finland only in the 1990s, research analysing the offer price range or partial adjustment hypothesis is still limited. Therefore, this study contributes to the IPO related research also by presenting new findings about the IPO pricing process and the offer price range in Finland.

1.5 Data and scope of the study

To study the subject statistically, a sample of 45 Finnish IPOs between January 1, 1995 and December 31, 2006 is used. Only IPOs where an initial offer price range is announced are included in the sample. The statistics describing the width and the level of the offer price range in the sample IPOs are analysed to provide information about the characteristics of the ranges in the Finnish market. The impact of certain firm and offering specific characteristics and market conditions on the width of the offer price range, the price adjustment from the range midpoint to the final offer price, and initial returns is tested with the ordinary least squares linear regression analysis. Information about the firms and the offerings has been mainly collected from prospectuses of the listed companies.

As this paper is about the initial offer price range, underpricing of IPOs is discussed only to the extent it serves the main purpose of this study, and only such underpricing related theories that are considered most relevant in this context are presented. As the study focuses on the Finnish market, only Finnish IPOs are included in the study. The time frame is limited to 12 years due to the availability and quality of data.

1.6 Structure of the paper

The rest of the paper is organised as follows. The second section discusses briefly the stages and the institutional aspects of the IPO pricing process in Finland and the role of the initial offer price range in the procedure. The third section presents a short literature review and discusses some of the IPO pricing related theories that could have relevance in explaining the determinants of the offer price range. In the fourth section the data and the chosen methodology are described, and hypotheses are developed on the basis of the research question. The fifth section presents the results of the analysis, and finally the last section concludes and suggests ideas for further research.

2 Pricing of initial public offerings

2.1 Challenges with IPO pricing

The decision to go public is an important step in the life cycle of a firm. Stock exchange listing serves for two main purposes: it allows the company to raise equity financing from the market, and enables public trading of the firm shares (Jenkinson and Ljungqvist, 1996). There are several other benefits and motivations to go public. In a recent study by Brau and Fawcett (2006), the most important reason for CFOs' stock exchange listing decisions was shown to be facilitation of acquisitions.

The pricing of initial public offerings have proven to be difficult. The value of shares in IPOs is difficult to evaluate, as there is no past analyst research and no market prices that could be observed, and because many of the issuing firms have little operating history (Ibbotson et. al, 1994; Sherman, 2005). The shareholders and the management of the company have informational advantage towards investors due to their clearly better knowledge of the company's past performance, current financial standing and future prospects.

The management acts in the interest of the original shareholders whose interest is to achieve as high a price for the issue as possible to maximise their wealth. The investors who are interested in purchasing or subscribing shares in the offering naturally want to pay as low a price as possible. The arranger of the offering has to find the right balance between the conflicting interests and the supply and the demand to be able to arrange a successful IPO. If the price is set too low, the issuing firm does not get the full benefit from its ability to raise capital and the wealth of the firm is transferred to new investors. If the offering is priced too high, the investors are likely to reject the issue. Sometimes the market is not willing to pay the minimum price required by the issuer, and the IPO has to be cancelled.

2.2 IPO pricing process

Figure 1 shows a simple IPO pricing process timeline that is based on the figure presented by Lowry and Schwert (2004). The first stage of the pricing process occurs when the issuing firm together with the underwriters decide the *initial offer price range* that indicates what they

expect the final offer price to be. The initial offer price range is set out in the prospectus published by the issuer. After the book building process where indications of interest are gathered from investors, the issuer and underwriters set the *final offer price*, which is the price at which the shares are offered to the investors. The final offer price is disclosed shortly before the IPO occurs and the public trading with the company's shares begins. When the final offer price is set, one can observe the percentage change between the midpoint of the initial offer price range and the final offer price that Lowry and Schwert refer to as the *price update*.¹

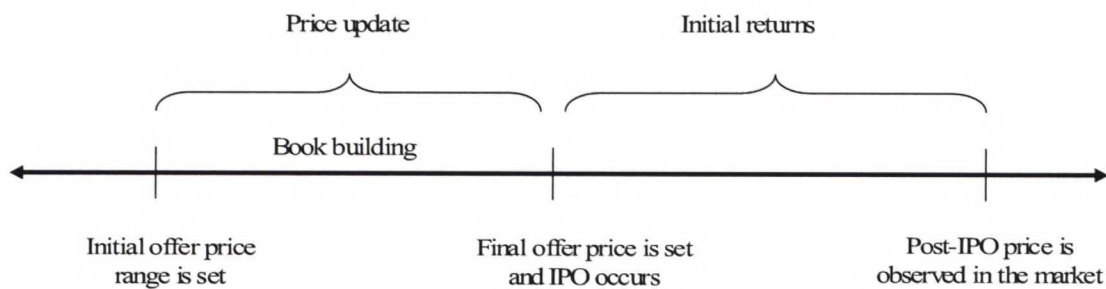


Figure 1 IPO pricing process timeline

The figure presents a simple timeline for IPO process. The timeline has been adapted from a figure presented by Lowry and Schwert (2004).

Finally, when the public trading with the firm's shares has begun, the market price for the shares can be observed. The relation between the final offer price and the market price shortly after the listing is interesting, as it signals whether the issue was priced at a correct level in relation to the market demand. The possible underpricing of IPOs can be identified by calculating the *initial returns* for investors, which are measured as the difference of the post-market price that can be observed in the secondary market (generally the first-day closing

¹ The terminology used varies with respect to the percentage change between the midpoint of the offer price range and the final offer price. Lowry and Schwert (2004) call it *price update*, whereas e.g. Jenkinson et. al (2006) refer to it as *price adjustment* and Hanley (1993) simply as *change in the offer price*.

price) and the final offer price paid by the investors (see e.g. Ritter and Welch, 2002). The phases of the pricing process in Finland are presented more in detail below.²

2.2.1 Prospectus and indicative offer price range

Before the company can officially start marketing its initial public offering, it has to file a prospectus. The purpose of the prospectus is to market the offering to potential investors and give them sufficient information about the firm and the offering so that they are able to make their investment decision. The prospectus may be published only after it has been approved by the Financial Supervision (Rahoitustarkastus), which is the authority supervising the Finnish financial market. There is no preliminary prospectus in the Finnish IPO process as for example in the IPOs in the US (see e.g. Jenkinson et al., 2006).

The information content of the prospectus is highly regulated to protect the investors. The legal framework regarding Finnish securities market and the listing procedure consists of many regulatory sources.³ The detailed requirements for the contents of the prospectus are regulated mainly by European Commission Regulation (EC) No 809/2004.

According to the EC regulation 809/2004, the prospectus must disclose the terms and conditions of the offer, including an indication of the price at which the securities will be offered. If the price is not known, the prospectus has to indicate the method for determining the offer price, including a statement as to who has set the criteria or is formally responsible

² The institutional aspects in the description of phases of the Finnish IPO process are based on an interview with Mr. Ville Kajala, Market Supervisor, Financial Supervision, on 10th of January, 2007.

³ The applicable regulations for the listing procedure and the prospectus in Finland include at least the following: The Finnish Securities Act, European Commissions Regulation (EC) No 809/2004, Ministry of Finance Decrees 452/2005 and 538/2005, CESR's recommendations for the consistent implementation of the European Commissions Regulation on Prospectuses no 809/2004, and Financial Supervision Authority Interpretation 3/2005. In addition, the standards of FSA guide the listing process, and also Helsinki Stock Exchange has certain rules and requirements relating to the procedure.

for the determination. Furthermore, the process for the disclosure of the offer price has to be described (see EC Regulation 809/2004, Annex III, Section 5.3.1. Minimum Disclosure Requirements for the Share Securities Note).

The regulation does not contain very explicit instructions about the disclosure of the anticipated offer price range. In practice, an indicative offer price range with a maximum and minimum price is disclosed in the prospectus if the offer is not a fixed price offer. The initial range is based on underwriter's analysis of the market value of the issuing firm and is decided by the underwriter and the issuer. To meet the legal requirements for the pricing information, prospectus usually includes a statement describing the initial range and the procedure for setting the final offer price. For example the IPO prospectus of Ahlstrom Oyj in 2006 included the following statement⁴:

"The Offer Price will be determined through a book building process in which the Company decides the final Offer Price on the basis of the price indications given by institutional investors during the marketing of the Offering. The Initial Offer Price Range is 20.00 – 24.00 euros per Offer Share. The final Offer Price will be decided and communicated through a stock exchange release around 13th March 2006. The final Offer Price of the Offer Shares may be above or below the Initial Offer Price Range. The Offer Price is the same for all investors participating in the Offering."

The underwriter may pre-market the issue and exchange information regarding the pricing and the interest in the offering with institutional investors already before the prospectus has been published. The additional information obtained from investors may be helpful for the underwriter and the issuer in setting the initial offer range at an appropriate level and in some cases in even deciding whether the timing is right for the IPO. Jenkinson et al. (2006) described the institutional setting of the IPO process in the US and Europe and noted that information exchange between the arranger and investors before the IPO filing period has officially begun is less restricted in Europe than in the US.

⁴ Free translation from the Finnish IPO prospectus of Ahlstrom Oyj dated 24 February 2006.

2.2.2 *Book building*

The next stage of IPO pricing is to market the offering to investors in a road show conducted by the management and the underwriters. The underwriters conduct a book building process, during which institutional investors are asked for indications of interest at different price levels. The final offer price is decided on the basis of the book building and depends on the positive and negative signals received from investors about their willingness to participate in the offering.

Book building has been used in the US IPOs for a long time and has largely replaced fixed price offerings also in Europe (see e.g. Ljungqvist et al., 2003; Ritter, 2003). The same development has occurred in the Finnish IPO market. The Finnish principles regarding the allocation of shares differ from the US practice. In Finland the arranger has to treat the investors impartially and cannot therefore decide the allocation of shares free from restrictions.⁵ The allocation principles regarding the offering have to be published in the prospectus. Sherman (2000) categorised the process used in Finland as the open offer method due to the restrictions in the allocation of shares.

2.2.3 *Setting of final offer price*

Based on the indications of interest and possibly other relevant information received during the book building, the underwriters and the firm management decide the final offer price. If the demand for the issue is higher than expected, the final offer price may be set above the expected price, i.e. the midpoint of the indicative range. Alternatively, if the demand is lower than expected, the final offer price will be below the expected price. Formally this means that the issuer completes the prospectus, as the prospectus that was earlier published did not set out the exact price at which the shares are offered to investors, but only an indicative range

⁵ The Securities Market Act 2:1 provides that “*securities shall not be marketed or acquired in business by giving false or misleading information or by using procedure that is contrary to good practice or otherwise unfair*”. The Financial Supervision has specified in Standard 5.2a that this means that the arranger has to treat investors impartially.

and the method how the final offer price will be determined. In practice, the completion is done through a stock exchange release prior to the listing date whereby the final offer price is announced. No new version of the prospectus is published, but the release is considered as a part of the prospectus and a copy of the release is just added in between the prospectus. The completion of the prospectus does not need to be separately approved by the Financial Supervision as long as the final offer price remains within the indicative offer price range.

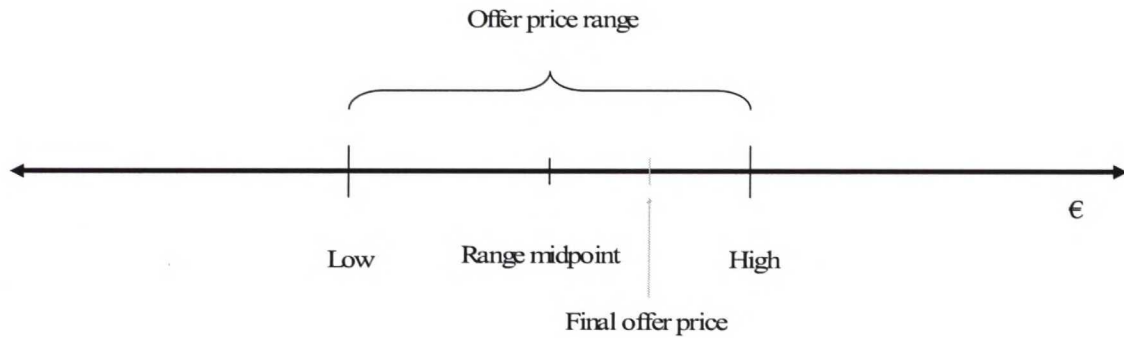


Figure 2 Offer price range and final offer price

Figure 2 presents the relation between the initial offer price range and the final offer price. The initial offer price range is not binding. The final offer price is often within the initial range (as in Figure 2), but it may also exceed the upper or lower limit. If the final offer price exceeds the upper or lower bound of the range, it is no longer considered as a completion of the prospectus information, but a change in the terms of the offering. This has at least two immediate implications. Firstly, the Financial Supervision has to approve the change in the terms. Secondly, the investors have an option to cancel their participation in the offering within two banking days of the change.⁶

Also the initial offer price range can be amended before the IPO. If the issuing firm finds out during the book building that the interest in the offering differs significantly from what the

⁶ The cancellation right of the investors derives from the directive 2003/71/EY, which has been implemented in the Finnish Securities Market Act 2:3c.

issuer had expected, it may be reasonable to revise the offer price range instead of just setting the final offer price outside the range. The revision of the offer price range is again a change in the terms of the offering, so the change has to be approved by the Financial Supervision and the investors are allowed to cancel their share subscription. However, in this case the two days' cancellation option will elapse already during the subscription period. Provided that the final offer price remains within the amended range, the investors who have not used their cancellation right during the subscription period have no longer the right to cancel their subscriptions when the final offer price is decided. Therefore, by amending the initial offer price range the company can avoid waiting two days after they have set the final offer price before they know whether any investors will cancel their participation in the offering. The price range amendment is done in practice by means of a stock exchange release after the Financial Supervision has approved the amendment.

2.3 Determinants of initial offer price range

2.3.1 Purpose of offer price range

The first stage of IPO pricing is to decide the initial offer price range that is set out in the prospectus. The purpose of the range is to communicate to investors a range within which the issuer expects the final offer price to be set. It provides a first benchmark for investors when they consider participating in the offering. The significance of the initial price range is reduced by the fact that the range can be amended and that the final offer price can be set outside the range. Even though the initial offer price range is not a binding commitment to offer the shares in the IPO at a particular price, it is still an important stage of IPO pricing, as especially in European IPOs the limits of the range are rarely exceeded.

In addition to the level of the range that signals the approximate value that the issuer expects the investors to be willing to pay for one share in the issue, the arranger and the issuing firm have to decide the width of the offer price range. The width of the offer price range means how far from each other the high and low values of the range are. There are no regulations or recommendations by the Financial Supervision or other authorities regarding the width of the range in Finland, whereas the US Securities Exchanged Commission (SEC) has given

guidance on the appropriate range width in the US IPO market (see e.g. Jenkinson et al., 2006).

What then determines the level and the width of the offer price range? The issuing firm and the underwriter have to utilise the information available to them when setting the initial range. Secondly, the interests of the parties involved are likely to affect the range.

2.3.2 Information available to issuing company and arranger

The issuing firm and the underwriter have to set the indicative offer price range on the basis of the information available to them when setting the range. First, issuing firms and underwriters are likely to base the offer price range on firm and offering specific characteristics that can be observed in the prospectus (see e.g. Daily et al., 2005). Company characteristics that are expected to be relevant in setting a price for an IPO include for example factors relating to share ownership, financial standing, past financial performance, industry and company age. Typical factors relating to the offering that may impact IPO pricing comprise timing, reason and size for the offering as well as parties involved in the IPO. These kind of firm and offering specific characteristics affect the investors' willingness to subscribe shares at a certain price and therefore are expected to have impact on the setting of the initial offer price range.⁷

Secondly, market conditions are likely to affect the IPO pricing (see e.g. Ibbotson and Jaffe, 1975). Underwriters and issuer firms gather information about investors' appetite to IPOs in general and about the status and prospects of the stock market to find out whether the timing is appropriate for an IPO and whether the market is receptive for IPOs.

⁷ Obviously the generally applied stock valuation methods capture many of the factors mentioned here. Such methods are not described in detail in this study (for more information see e.g. Kim and Ritter, 1999).

2.3.3 *Interests of involved parties*

There are several parties involved in the IPO process with differing interests. Investors are hoping for high returns for the shares that they subscribe in the IPO, the management of the issuer company is focusing on the long-run performance of the firm, the original shareholders want the best possible compensation for their exit if they are selling their shares or for the dilution of the company's wealth if they are holding their shares, and the investment bankers are keen on keeping their reputation and maximising their fees.

Interests of the parties involved in the IPO are likely to affect the *width* of the range. It is in the interest of both the issuing firm and the underwriter to set an accurate and realistic offer price range to be able to credibly signal their estimation of the market value of the firm. The credibility pressure pushes the issuer and the underwriter towards a relatively narrow offer price range.

A very wide range would signal to the market that the arranger is very uncertain about the true value of the firm and the market demand for its shares. The arranger has its reputation on stake and therefore does not want to give such a signal. Also, the investment bankers do not want the offer price to be too far outside the estimated range, as it might question their expertise. An exceptionally wide range could also signal that the original shareholders are willing to cash out their shareholdings for almost any price. Narrower range indicates to the market that the management is confident in their estimations about the market value of the firm and gives a positive signal about the capability of the management.

On the other hand, if the offer price range is too narrow, it leaves less flexibility for the issuer to adjust the final offer price without providing investors a chance to withdraw from the offering after their subscriptions. If the final offer price is outside the initial offer price range, the investors have the possibility to cancel their subscriptions during two days. It has been suggested in earlier literature that underwriters and issuers who are uncertain of the issue price are likely to set wider offer price ranges to allow for greater flexibility in setting the final offer price (Hanley, 1993).

Range width can also depend on how the market reacts to an offer price that is outside the range and how common it is in the market in question. Jenkinson et al. (2006) found that the limits of the range are exceeded much more often in the US than in European IPOs. In Germany it has even been suggested that investment banks have been hesitant to exceed the initial range due to the risk of investor legal action (Jenkinson et. al, 2006).

Differing interests can affect also the *level* of the initial offer price range. A company may consider it very important that their IPO succeeds, and is therefore willing to set the range to a low level to make sure that there is enough interest in the offering. A successful IPO and a high final offer price in relation to the expected price may give a positive signal to the market about the firm. It is also possible that investment banks are careful in their estimations of the price that can be obtained from the market, as a higher final offer price leaves a good taste in the original shareholders' mouths (see Loughran and Ritter, 2002) and enables the investment banks to justify their high fees.

3 Earlier research

IPO pricing has been a popular topic within the finance related research. However, research has focused to a large extent on later stages of IPO pricing, and there are only a few studies relating to initial offer price range, which can be considered the first stage of the IPO pricing process.

3.1 Studies on initial offer price range

Jenkinson et al. (2006) paid attention to that European IPOs are very rarely priced outside the initial offer price range. In their sample of 740 European and 2,930 US IPOs between January 1994 and July 1999, half of the US IPOs were priced outside the indicative price range, whereas only in one-tenth of European IPOs the final offer price exceeded the bounds of the initial range. Furthermore, the final offer price was set at the higher bound of the range in almost 47% of the European IPOs.

The unresponsiveness of European initial price ranges to the demand as revealed during book building is according to Jenkinson et al. not a symptom of inefficiency, but can be explained with differences in the book building process. In Europe, the issuer and investors are able to exchange information regarding the pricing and the demand for the offering already before the initial offer price range is set, and issuer's unofficial commitment to stay within the range is needed to obtain private information from investors. In the US, the information exchange before the preliminary prospectus is filed is very restricted. As a result of the information exchange prior to setting the initial offer price range, the ranges are more accurate in Europe than in the US. Jenkinson et al. found that the midpoint of the range was on average seven percent closer to the first week closing price in Europe than in the US. Furthermore, average underpricing was no higher in Europe than in the US despite of the fact that the initial offer price range was exceeded less frequently, which supports the proposition by Jenkinson et al.

As the underwriters do not have as much information available in the US as in Europe when setting the initial offer price range, it could be anticipated that the range is wider in the US than in Europe. However, the average width of the initial offer price range was approximately 15% in the US and 16% in Europe in the IPO sample of Jenkinson et al. This appears to be

caused by the fact that the width of the initial price range tends to be based on SEC guidance in the US and governed by convention rather than the uncertainty relating to the value of the IPO. Until September 2001, the SEC guidance recommended a price range not wider than greater of \$2 or 10% of the lower price, and thereafter \$2 or 20% of the lower price. This has resulted in a tendency to set a price range of exactly two dollars (see also Ritter, 2003). In contrast, Jenkinson et al. found no evidence on any clustering of range widths in Europe.

Daily et al. (2005) tried in their study to identify firm and offering specific factors that affect the IPO offer price range and the offer price. Daily et al. gathered from prospectuses of 192 IPOs in the US the following characteristics that are generally considered to be associated with uncertainty regarding the IPO value: are CEOs founders of the firm, CEO-retained equity, board size and composition, board prestige, involvement of venture capitalists, firm size and age, and pre-IPO profitability. The factors were assumed to signal the firm value to investment bankers when they determine the offer price range and the offer price of the IPO. However, Daily et al. found no evidence of the assumed relation of the chosen factors to the width of the offer price range.

3.2 IPO underpricing theories

Underpricing of IPOs is a generally and universally identified phenomenon in the stock market. Underpricing, generally also referred to as first-day returns or initial returns, is commonly measured as the difference between the final offer price and the first-day closing price (see e.g. Ritter and Welch, 2002). Ritter and Welch documented an average initial return of 18.8 percent in their sample of 6,249 IPOs in the US between 1980 and 2001. Keloharju (1993) analysed the Finnish IPO market with a sample of 80 IPOs between years 1984 and 1989 and found an average initial return of 8.7%.

When an issue is underpriced, investors buy the shares at discount and a part of the wealth of the original shareholders is transferred to the new owners (see e.g. Loughran and Ritter, 2002). There are several possible explanations for why issuers leave money on the table in IPOs, most of which are based on the assumption of information asymmetry between the

parties involved in the IPO process. In addition, there are many recent theories based on the allocation and trading of IPO shares.⁸ However, as allocation and trading are activities that take place only after the initial offer price range has been decided, these theories are likely to have only limited relevance in determining the range. Therefore, theories based on asymmetry of information are assumed to be the most relevant theories in studying the factors affecting the width of the initial price range and the revisions of the offer price. The basic concepts of theories that are considered to have potential in explaining the relation between the width of the offer range, the final offer price and underpricing are summarised below.

3.3 Uncertainty regarding IPO value and winner's curse

Beatty and Ritter (1986) demonstrated already two decades ago that the uncertainty of investors regarding the value of the IPO is related to the underpricing of the offering. The greater is the *ex ante* uncertainty regarding the value of the issue, the greater is the expected underpricing.

The theoretical basis of their study was the theory on *winner's curse* developed by Rock (1986). According to the winner's curse theory, some of the investors possess more information than others, which helps the investors with superior information to choose to participate in the good IPOs and stay away from the bad ones. When too many investors want to participate in an offering, the investors get rationed. An investor would receive full allocation in overpriced IPOs but only a partial allocation in underpriced IPOs. Many investors are afraid that they will only receive full allocations of IPO shares if they are among the most optimistic investors. Therefore, IPOs have to be underpriced on average to attract investors to participate in initial public offerings.

⁸ See e.g. Ritter and Welch (2002) and Jenkinson and Ljungqvist (1996) for classification of underpricing theories on the basis of their basic assumptions.

3.4 Partial adjustment phenomenon

Benveniste and Spindt (1989) studied the IPO book building process and proposed that IPO pricing is a dynamic information acquisition process: IPO offer prices must be set low to provide profit to compensate investors for revealing positive information during the book building. This *dynamic information acquisition hypothesis* suggests that the final offer price only partially reflects the positive information acquired by the underwriters during the book building process. As the final offer price does not fully incorporate the positive information, the initial returns for investors are higher. Benveniste and Spindt predicted that firms that have greater uncertainty regarding the value of the shares to be issued are more likely to have their offer price revised.

Hanley (1993) studied the partial adjustment phenomenon and particularly the relation between the initial offer price range, final offer price and underpricing with a sample of 1,430 IPOs between January 1983 and September 1987 in the US. She documented that the change in the offer price from the midpoint of the initial price offer range is a good predictor of underpricing. She divided the IPO sample into three categories based on whether the final offer price is above the initial offer price range, within the range or below the range. Share issues that had final offer prices exceeding the higher bound of the range had higher initial returns. She found average initial returns of 20.7% for issues exceeding the higher bound, whereas the average initial returns for issues within the anticipated range were 10.0%. Results evidencing the same pattern have later been documented by other researchers (see e.g. Loughran and Ritter, 2002). According to Hanley, her findings were consistent with the prediction of Benveniste and Spindt (1989) stating that positive information gathered by underwriters from potential investors during book building is only partially reflected in the final offer price.

Furthermore, Hanley studied the determinants of adjustments in the final offer price in relation to the expected offer price, i.e. the range midpoint. She analysed several factors that she anticipated to be related to price adjustments, including uncertainty relating to the true value of the issue. She proxied uncertainty regarding the IPO value with the percentage width of offer price range, and found that the offer price revision is positively related to the width of the offer price range. The wider the range, the greater the uncertainty regarding the IPO value and the greater the absolute change in the final offer price relative to the range midpoint.

3.5 Partial adjustment to public information

The model developed by Benveniste and Spindt predicts a partial adjustment with respect to private information, as investors have to be rewarded to truthfully reveal their demand for the issue. The model assumes that public information is incorporated into the offer price.

However, several academics have found positive relation between initial returns and changes in the market index between the initial offer price setting and the decision on the final offer price (see e.g. Loughran and Ritter, 2002; Lowry and Schwert, 2002 and 2004). Changes in the market conditions are public information, so the finding contradicts the Benveniste and Spindt hypothesis.

Lowry and Schwert (2004) studied how underwriters treat public information during the IPO pricing process. They analysed whether public information is fully incorporated to the initial price range and the final offer price. Lowry and Schwert focused on analysing the percentage difference between the midpoint of the initial price range and the final offer price, the price update. They found that certain firm and offering specific characteristics, such as underwriter prestige, industry and offering size, are able to explain the price update in a similar way than they explain underpricing. Market returns before setting the initial range were also found to be positively related to the price update. The ability of firm and offering specific factors to explain underpricing has been generally interpreted as supporting information asymmetry hypothesis. According to Lowry and Schwert, the ability of such variables to predict also price update signals that public information is not fully incorporated to the initial offer price range.

Furthermore, market returns during the filing process, i.e. after the initial offer price range is set but before the final price is decided, were shown to be positively related to the price update. However, the low economical significance of their finding suggests that almost all public information is incorporated to the final offer price. In this respect their results differed from the study by Loughran and Ritter (2002).

Wu (2005) examined the relation between price adjustment, initial returns and subsequent short-run performance with a sample of IPOs from 1986 to 1996 in the US, and found that

offer price adjustment predicts not only initial returns but also subsequent short-run performance. Bradley and Jordan (2002) studied the partial adjustment by analysing amendments of the offer price range and documented that file range amendments are significantly related to IPO underpricing.

There are several explanations for the partial adjustment to public information. The *prospect theory* explanation of partial adjustment phenomenon presented by Loughran and Ritter (2002) is based on the assumption that issuers care about the change in their wealth rather than the level of wealth. Owners do not mind leaving money on the table as much when the post-market valuation of the company and thus their wealth after the IPO turns out to be higher than they expected. Therefore they do not care about the underpricing of the IPO if the value of the issue exceeds their expectations.

In addition to the prospect theory, Loughran and Ritter (2002) summarised other explanations for the partial adjustment phenomenon. Investment bankers have presented that potential investors anchor on the midpoint of the offer price range as issuers do. If the final offer price will be too much higher than the midpoint, some of the potential investors withdraw from the offering. The simpler element of this argument is that raising the offer price reduces the excess demand. The more sophisticated element of the argument is based on *cascades* argument by Welch (1992): if investors pay attention to the behaviour of other investors, a remarkable increase of the offer price poses a risk to the issuer, because a withdrawal of some of the investors may cause many other investors to decide not to participate in the offering.

Leaning against the wind hypothesis states that investors in the IPO market tend to overreact. When the market is too hot, the market prices rise too high and above the long-run value of the share. The underwriters price the issues considering the long-run value of the firm. This phenomenon could provide one explanation to the partial adjustment phenomenon. Both supporting and inconsistent evidence has been found in empirical studies on the hypothesis (for negative results see e.g. Loughran and Ritter, 2002, and for positive ones see e.g. Ritter, 1991).

If an issuer thinks that the issue was too heavily underpriced, investment bankers can claim that the higher than expected underpricing was due to their successful marketing efforts of the

issue that caused the high demand for the issue. Consequently the share price may also come down before the lock-up period, which prevents the issuers from selling their shares during certain time, is over. This factor can also explain some of the partial adjustment (Loughran and Ritter, 2002).

Also *bargaining power theories* could serve as an explanation for the phenomenon (Daniel, 2002). If the issuing firms believe that hot IPO markets are particularly good time to go public due to high valuation of the firms within their industry, their bargaining power against underwriters and institutional investors may be weak. In a cold IPO market the cost of delay for the issuer is lower and its bargaining power stronger, as the firm can credibly threat to postpone the issue.

3.6 Signalling theory and agency hypothesis

The signalling hypothesis developed by Leland and Pyle (1977) suggested that the original shareholders signal the value of their firm to outside investors by retaining equity in initial public offerings. The original shareholders have informational advantage over new potential investors regarding the value of the IPO. The owners may signal their information and confidence regarding the firm value to the market by retaining a high proportion of the shares. Signalling is costly to the entrepreneur, as by holding a larger share of the firm stock he forgoes diversification of his personal portfolio. Therefore, he retains significant ownership only if he expects the future cash flows of the firm to be on a high level relative to the current firm value. Investors see this and are therefore willing to pay more for the company's shares in the IPO.

Downes and Heinkel (1982) tested the signalling theory by analysing the relation between the proportion of equity ownership retained by entrepreneurs and market value of the firm after the IPO. Their results supported strongly the signalling hypothesis. Keloharju and Kulp (1996) studied the signalling theory with a sample of 60 Finnish IPOs between years 1984 and 1993 by using market-to-book ratio as the measure of market value. They documented a significant positive relation between the fraction of equity retained by the original shareholders and the market valuation, which is again in favour of the hypothesis by Leland and Pyle. On the other hand, Ritter (1984) did not find statistically significant support to the

signalling hypothesis when he studied the relation between firm value and equity retention by insiders with US data.

Ljungqvist (1997) tested whether the hypothesis of the negative relationship between initial returns and retention rates presented by Wasserfallen and Wittleder (1994) holds in a sample of 189 German IPOs. The hypothesis was based on the assumption that by retaining more equity the original owners signal their commitment to the company and thus reduce the associated risk, which in turn should result in lower underpricing. Instead of the assumed negative impact, Ljungqvist found that insider retention rates are positively related to initial returns. Bradley and Jordan (2002) also documented a negative relationship between underpricing and equity retention. They explained the finding with the reduction in the costs of underpricing to the original shareholders if they retain more equity. As the shares retained by shareholders are valued at market prices, the firms with greater equity retention can afford to have higher level of underpricing.

Hence, the evidence regarding the applicability of signalling theory is contradictory. If signalling theory holds, the original shareholders can by retaining a significant proportion of the firm's shares reduce the investors' uncertainty regarding the value of the IPO. A large insider share ownership would thus imply lower uncertainty, which would be associated with a narrow initial offer price range and less price adjustment from the range midpoint to the final offer price.

Agency hypothesis (see Ritter, 1984) provides an alternative explanation for the relation between the firm value and insider holdings. Agency hypothesis assumes that an increase in ownership of managers reduces agency problems between owners and managers and therefore increases the firm value. If the managers own a large share of the firm, there will be less managerial shirking and less monitoring costs for the firm, which enhances the value of the company. Keloharju and Kulp (1996) analysed a sample of 60 Finnish IPOs and found a positive relation between the firm value and the management ownership supporting the agency hypothesis at low ownership levels, but the relation was not significant at high ownership levels.

3.7 Venture capitalist certification theory

There are several studies on the effect of a third party certification on the pricing of initial public offerings. Certification theories are closely related to the signalling theory. The basic idea of the certification theory is that insiders have more information on the issue than the outside investors, but the involvement of a reputable third party reduces the uncertainty of the IPO in investors' minds and serves as a signal that the firm going public is a good firm. Many of the studies have focused on the relationship between underwriter prestige and IPO pricing (see e.g. Beatty and Ritter, 1986) or auditor quality and IPO pricing (see e.g. Michaely and Shaw, 1995).

Also the role of venture capitalists (VCs) in IPO pricing has been studied in the financial research. Venture capitalist certification theory suggests that venture capitalists are able to reduce the information asymmetry with respect to an initial public offering. The investors' uncertainty regarding the value of an issue is reduced, as the involvement of venture capitalists as certifying agents signal the value and quality of an IPO to potential investors. Reduced uncertainty results in lower underpricing of IPOs. Megginson and Weiss (1991) found support for the venture capitalist certification theory by documenting lower underpricing for issues involving venture capitalists in comparison with similar issues without venture capitalist involvement. Their sample consisted of 320 VC backed and 320 non-VC backed IPOs between 1983 and 1987.

Jain and Kini (2000) documented that involvement of venture capitalists also improves the survival profile of IPOs. However, later studies have shown evidence against the venture capitalist certification theory. For example Bradley and Jordan (2002) discovered that venture capitalist backed firms usually incur higher level of underpricing, and after controlling certain effects causing this bias, no difference in underpricing was found between VC backed and non-VC backed IPOs.

3.8 Effect of market conditions on IPO pricing

Timing of the IPO is one of the main concerns for companies that consider going public (Brau and Fawcett, 2006). Managers try to take advantage of investor appetite and attractive stock

prices when they think about the right timing for the IPO. Several studies have shown that the amount of IPOs fluctuates remarkably over time (see e.g. Ibbotson and Jaffe, 1975; Lowry, 2003).

Lowry (2003) studied three potential explanations for the high fluctuation of IPO volume. She found that the business cycle is related to the IPO cycles: changes in firm's demand for capital affect the IPO volume. Also changes in the level of investor optimism explain the IPO volume fluctuations. Furthermore, variation in investors' uncertainty regarding the true value of firms had some significance in explaining the activity of IPO market, but not as much as the demand for capital and investor optimism.

In the context of studying initial offer price range, it is interesting to analyse whether market conditions affect not only the timing but also the pricing of IPOs. As first noted by Ibbotson and Jaffe (1975), high level of underpricing is followed by increased number of IPOs. According to Lowry and Schwert (2002), the average initial returns at the time when a company files an IPO do not contain any information about the level of underpricing for that company. Rather, underpricing is related to positive information learned during the IPO pricing process that is not fully incorporated into the final offer price, which causes higher underpricing of IPOs. Therefore companies cannot achieve lower underpricing by filing their IPOs during periods of low average initial returns. Companies file IPOs following periods of high initial returns, because the high returns are related to positive information obtained during the registration periods of the offerings, implying that companies can raise more money in an IPO than previously expected due to positive market demand.

Ljungqvist (1997) studied the relation between market returns and underpricing with German IPO data and found that favourable market conditions significantly increase initial returns. Lowry and Schwert (2004) documented that market returns both before setting the initial price range and during the filing process before the final price is set are positively related to the adjustment of the final offer price in relation to the midpoint of the offer price range.

The market indicators that the companies can look at when considering whether the market and investors' appetite is favourable for a new issue are for example overall stock market conditions (Lucas and McDonald, 1990; Ritter and Welch, 2002), industry conditions (Pagano

et al., 1998; Lowry, 2003), or recent first-day stock performance of IPOs (Lowry and Schwert, 2002). In practice, CFOs consider the overall market and industry conditions very important when considering the timing of the IPO, but do not pay that much attention to the recent first-day stock performance (Brau and Fawcett, 2006).

3.9 Summary of the literature review

Earlier studies have shown that the level of the offer price range is related to underpricing of IPOs (see e.g. Hanley, 1993; Loughran and Ritter, 2002; Lowry and Schwert, 2004). If the range is at a low level relative to the demand for the issue, the final offer price will be adjusted upwards from the range midpoint. However, positive information obtained during the IPO process is not fully reflected in the final offer price, which results in higher initial returns.

Hanley (1993) and Benveniste and Wilhelm (1997) used the width of the offer price range as a measure of the *ex ante* risk of the IPO. Underwriters who are uncertain of the issue price are likely to set wider offer price ranges to allow greater flexibility in determining the final offer price. Hanley documented that the wider the range, the greater is the change in the final offer price with respect to the expected offer price. Jenkinson et al. (2006) showed that the width of the range has relevance at least in Europe, as the bounds of the initial offer price range are seldom exceeded.

Many underpricing theories are based on the assumption that underpricing of IPOs results from uncertainty regarding the value of the IPO. Also the level and the width of the offer price range are assumed to be affected by the uncertainty regarding the IPO value. The more there is uncertainty regarding the value, the wider the initial price range is likely to be and the more adjustment from the midpoint of the initial range and the final offer price, as it is more difficult for the issuer and the arranger to estimate the correct price level for the offering.

4 Data, methodology and hypotheses

4.1 Data

The sample used in the study contains 45 Finnish IPOs. The sample consists of IPOs of Finnish companies that have been listed to the Helsinki Stock Exchange between 1995 and 2006. Only IPOs that had an initial offer price range set out in the prospectus are included in the sample, whereas all fixed price IPOs are excluded.

Even though the chosen window is as long as 12 years, the sample size is still limited due to the small size of the Finnish IPO market. The time limitation is necessary due to the availability and the quality of prospectuses.⁹ The regulatory requirements relating to the IPO pricing process have not changed significantly during the last ten years in Finland, even though the regulation sources and the market practices for example relating to the allocation of shares have changed to some extent. Changes in the regulation do not therefore cause remarkable data quality issues.

Prospectuses serve as the primary data source in the study. The data collection process was started by checking the availability of prospectuses and identifying IPOs that took place during the chosen period from the Helsinki Stock Exchange annual reports and from the collection of Finnish prospectuses at the Department of Finance in Helsinki School of Economics. Thereafter the data needed was collected from prospectuses at the Department of Finance in Helsinki School of Economics and from the web pages of the Financial Supervision and the listed companies.

Final offer prices are announced by the listed companies in a stock exchange release prior to IPOs. The announcements were collected from the websites of the respective companies and the website of the Nordic Exchange. The first-day closing prices of the IPOs were obtained

⁹ As Finnish securities legislation was still rather undeveloped during the 1980's and yearly 1990's, the amount and quality of information set out in prospectuses varied a lot.

from the webpage of the Nordic Exchange. The stock exchange index data was obtained from the OMX / HEX database at the Department of Finance in Helsinki School of Economics.

Figure 3 presents the number of IPOs included in the sample by listing year. Most of the initial public offerings in the sample took place during years 1999 (11 IPOs) and 2000 (14 IPOs), when the Finnish IPO market was hot and especially information, telecommunication and other high technology industries were booming. As a result, technology firm IPOs account for a major share of the sample representing 56% of the IPOs. After year 2000 the Finnish market has evidenced only eight initial public offerings with an offer price range.

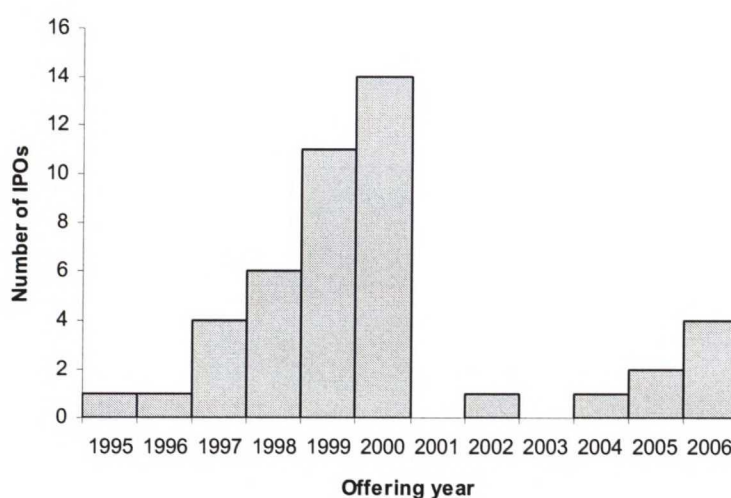


Figure 3 Distribution of the sample IPOs by offering year.

The figure presents a histogram of the distribution of IPOs by the year of the offering in the sample of 45 Finnish IPOs between 1995 and 2006.

4.2 Methodology

The statistical characteristics of the offer price range width, the offer price range midpoint, the final offer price and the initial returns in the sample IPOs provide a useful base for analysing many aspects of the offer price ranges.

Most of the hypotheses are tested by using the ordinary least squares (OLS) linear regression analysis with multiple variables. OLS regression analysis is a commonly used statistical method in financial research. It minimizes the sum of squared residual vertical distances between the data points and the regression line. OLS model can be presented as follows:

$$Y_i = b_0 + b_1x_{i1} + b_2x_{i2} + \dots + b_kx_{ik} + e_i \quad (1)$$

where Y_i is the dependent variable that the regression model explains, $x_{i1}, x_{i2}, \dots, x_{ik}$ are independent variables, and e_i is the error term. The intercept term is b_0 , and b_1 through b_k are the partial slopes.

The coefficient of determination R^2 is a commonly used measure of the predictive fit of the model. However, it does not decrease when new variables are added, which means that including all variables leads to the highest value. The adjusted R^2 takes into consideration the number of explanatory variables included in the regression and measures therefore the regression fit in a more reasonable manner than R^2 . However, as the objective is to test the impact of various independent variables on the dependent variables rather than to find a model explaining the offer range in full, the coefficient of determination is not crucial in this study.

The statistical t-test measures the significance of the regression coefficients. T-value indicates the number of standard error measures of the coefficient from zero, and p-value measures the significance of the test that the coefficient differs from zero. P-values of 0.01, 0.05 and 0.10 are indicated with ***, ** and *, respectively.

The limited sample size of this study decreases the explanatory power of the regression model. The sample size also limits the number of explanatory variables that can be inserted to the model.

OLS regression analysis has been widely used in earlier research analysing similar dependent variables, which gives comfort to applying the OLS regression methodology also in this study. Daily et al. (2005) used multiple regression analysis when analysing the impact of firm

and offering specific factors on the width of the offer price range. As regards testing the price adjustment, Lowry and Schwert (2004) and Hanley (1993) studied the effect of firm and deal specific characteristics and market returns on the price adjustment by using OLS regression analysis. Also initial returns have been widely studied by using traditional regression analysis approach (see e.g. Hanley, 1993). I construct several regression models to test the research hypotheses. The independent variables that the models try to explain are (i) the percent width of the offer price range; (ii) the percent change in the final offer price relative to the midpoint of the initial offer price range (the price adjustment); and (iii) initial returns.

Multicollinearity is controlled by running several different regression models and excluding highly correlated variables from the same models. Logarithms of chosen variables are used where appropriate to reduce skewness.

4.3 Research question and hypotheses

The research question set out earlier is to analyse the efficiency of the IPO pricing process and the determinants of the offer price range. More specifically, the thesis studies the effect of market conditions and firm and offering specific characteristics on the width of the initial offer price range and the level of the price range. The research question can be broken down into three categories and more specific hypotheses as follows:

A. Width of offer price range

1) Is there any observable pattern in Finnish range widths?

If there is some sort of consensus range or guidance by authorities that determines the range width, it can make further analysis of the determinants of the width meaningless.

2) Do firm and offering specific factors explain range width?

Positive result signals that underwriters decide the width of the range taking into account factors that are generally associated with uncertainty regarding the IPO value.

3) *Do market conditions before prospectus date explain range width?*

Positive answer suggests that arrangers consider the uncertainty relating to market conditions when they set the offer price range.

B. Price adjustment (relation between the level of the price range and the final offer price)

4) *Do firm and offering specific factors predict price adjustment?*

Positive result implies that underwriters do not use all the available information when setting the initial offer price range.

5) *Do changes in market index before setting of the initial offer price range explain price adjustment?*

Positive result indicates that all public information is not incorporated into the initial offer price range.

6) *Do changes in market index between the setting of the range and the setting of the final offer price explain the price revisions?*

Positive result proposes that the final offer price is adjusted based on recent market conditions.

C. Level of the price range, final offer price and first-day closing price

7) *Does price adjustment explain initial returns?*

Positive result indicates that final offer price is adjusted only partially on the basis of (private or public) information learned during filing period.

8) *Do changes in market index before the IPO explain initial returns?*

Positive result suggests that public information is not fully incorporated into the final offer price.

9) *Is the midpoint of the offer price range a good estimator of the final offer price and the first-day closing price?*

Positive result proposes that underwriters set the range at a relatively correct level and that pricing process is efficient at the first stage when the initial offer price range is set.

The detailed hypotheses on the expected relationships between the dependent and independent variables are presented below in the following paragraphs in connection with each variable.

4.4 Dependent variables

4.4.1 Percentage width of offer price range

I use regression analysis to identify factors that predict the width of the offer price range indicated in the prospectus. Daily et al. (2005) used the width of the initial offer price range set out in the prospectus in dollars as the dependent variable in their study. As this measure does not take into account the relative difference of the range in offerings with different price levels (e.g. a two dollar range is relatively wider for an offering with a midpoint of the range of five dollars than for an offering with a midpoint of ten dollars), the measure of the range width is scaled in this study. The width of the offer price range is measured as the percent width of the range, calculated as

$$\text{Width of the range} = (P_H - P_L) / P_E, \quad (2)$$

where P_H is the highest and P_L is the lowest price in the offer price range set out in the prospectus. P_E is the expected offer price, i.e. the midpoint of the range, and defined as $(P_H + P_L) / 2$. Jenkinson et al. (2006) used a similar measure when they documented widths of offer price ranges for a sample of European and US IPOs, whereas Hanley (1993) defined the width of the range with respect to the lower bound of the range. The measure used by Jenkinson et al. is chosen to enable a valid comparison with their sample, which included also European IPOs.

Underwriters who are uncertain of the price at which the issue could be sold to investors are likely to set wider offer ranges to provide more flexibility in setting the final offer price. The wider the offer range, the greater is the uncertainty regarding the true value of the IPO (Hanley, 1993). Variables that are associated with uncertainty regarding the IPO value are therefore expected to be positively related to the width of the range.

Width of the range is used in the analysis also as an independent variable predicting the change in the offer price from the range midpoint.

4.4.2 Price adjustment

Secondly, I form regression models that are expected to explain the revisions in the offer price. The change in the final offer price from the midpoint of the range is calculated as

$$\text{Price adjustment} = (P_O - P_E) / P_E, \quad (3)$$

where P_O is the final offer price and P_E is the midpoint of the range. The measure of price adjustment is consistent with earlier research (see e.g. Hanley, 1993; Lowry and Schwert, 2002; Jenkinson et al., 2006). P_E is defined as the midpoint of the indicative offer price range set out in the prospectus, not the midpoint of the amended range in case a new range has been set during the IPO process.

A large positive price revision indicates that the initial offer price range has been at a relatively low level and that the preliminary expectations of the issuing firm and underwriters regarding the issue price have been conservative. Respectively, a large negative price adjustment suggests that underwriters' expectations of the value of the issue have been too positive.

The above measure of price adjustment is replaced with *absolute* price adjustment in this study in certain regression models where firm and offering specific variables explain price adjustment. Absolute price adjustment measures the absolute difference of final offer price from the midpoint of the range (see also Hanley, 1993). It is calculated as

$$\text{Absolute price adjustment} = |(P_O - P_E) / P_E| \quad (4)$$

This proxy is more appropriate when analysing the relation between firm and offering specific characteristics and price adjustment, as I focus on whether the chosen factors affect the magnitude of price revisions. If there is more uncertainty regarding the value of the IPOs, the absolute price adjustment is expected to be high, whereas non-absolute price adjustment could be either highly positive or highly negative.

4.4.3 Initial returns

The third dependent variable to be studied with regression models is the initial returns of the IPOs. Reasons for underpricing are not studied in detail in this study, but I focus merely on the relationship between the price adjustment and initial returns as well as market returns and initial returns to find out whether partial adjustment phenomenon can be observed also in the Finnish IPO market.

Following earlier research, the logarithmic first day returns are calculated from the first day closing price and the final offer price as follows:

$$\text{Lognormal return} = \text{LN}(\text{first day closing price}) - \text{LN}(\text{offer price}) \quad (5)$$

4.5 Independent variables

4.5.1 *Pre-IPO stock market performance*

The relationship between market returns and underpricing has been extensively analysed in several IPO pricing related studies (see e.g. Ritter and Welch, 2002). Also the impact of market returns on the changes in the offer price from the midpoint of the initial offer price range has been investigated (see e.g. Hanley, 1993; Lowry and Schwert, 2004).

The chosen proxy for the market conditions in this study is OMX Helsinki Cap index (OMXHCAP, formerly Hex Portfolio Index). It includes all the shares listed on the Helsinki Stock Exchange, but the maximum weight of one share is limited to ten percent of the total market value of the index. OMX Helsinki Cap index is considered to be more suitable for illustrating the general state of the Finnish stock market than OMX Helsinki All-Share index due to the high volume of trading of Nokia shares in the Helsinki Stock Exchange. Hex General Index is used for the two oldest IPOs in the sample, as Hex Portfolio Index was introduced only after these IPOs. However, this is not likely to cause reliability issue, as the weight of Nokia trading at that time was not as high as today.

When studying the effect of market conditions on the IPO pricing, it is useful to divide the market information into two stages, namely market information available before the initial offer price range is set and information available between setting of the initial range and the decision on the final offer price range. The initial offer price range is anticipated to reflect the market information by that time, whereas price adjustment is expected to take into account the public information gained during the period before the IPO occurs.

Market conditions before the offer price range is set are measured with the percentage difference in the logarithmic values of OMXHCAP index between 90 days before the prospectus date and the prospectus date:

$$\frac{\text{LN (OMXHCAP index value at 90 days before the prospectus date)} - \text{LN (OMXHCAP index value at the prospectus date)}}{\text{LN (OMXHCAP index value at the prospectus date)}} \quad (6)$$

Firstly, market returns are expected to be *negatively related to the width of the offer price range*. A positive market situation is anticipated to lead to a narrower price range due to the reduced uncertainty regarding the demand for the offering. Secondly, the efficiency of price-setting process can be measured by analysing the relationship between market conditions before the indicative range is set and price adjustment from the range midpoint to the final offer price. There should not be any particular reason why price updates would be related to market returns before the initial range is set. If price adjustment can be explained with market returns before the prospectus filing, it indicates that IPO pricing is inefficient, as public information available before the initial price range is set is not fully incorporated into the level of the initial range (Lowry and Schwert, 2004). Market returns before offer price range is set are hypothesized to have *positive impact on the price adjustment*, suggesting inefficient pricing process.

Market returns during the period between the setting of the initial offer price range and the setting of the final offer price have been shown to be related to initial returns and price adjustment from the range midpoint to the offer price (see e.g. Hanley, 1993; Loughran and Ritter, 2002; Lowry and Schwert, 2004). Adjusting slightly the proxy used by Loughran and Ritter (2002)¹⁰, I measure the market conditions during the filing period with the percentage difference of the logarithmic values of OMXHCAP index between 15 days before the listing date and one day before the listing date, as the final offer price is often decided one day before the public trading with the issuing firm's shares begins:

$$\frac{\text{LN (OMXHCAP index value at 15 days before the listing date)} - \text{LN (OMXHCAP index value at 1 day before the listing date)}}{\text{LN (OMXHCAP index value at 1 day before the listing date)}} \quad (7)$$

Changes in the market from the prospectus date to the offer date are expected to be *positively related to the adjustment in the offer price*. New information that is likely to affect the stock market may be revealed after the initial price range is set. When market index increases

¹⁰ Loughran and Ritter (2002) categorised IPOs by market movement 15 trading days prior to the issue.

during the filing period, increases also the offer price, and market falls are associated with decreases in offer price.

Partial adjustment hypothesis can be studied by analysing the impact of market returns on underpricing. If positive market information received shortly before the IPO occurs increases initial returns, it indicates that the final offer price has not been increased from the range midpoint as much as the market conditions would have allowed. Therefore, a positive relation suggests that underwriters do not adjust the final offer price to full extent on the basis of the public information received during the filing period, which supports the partial adjustment hypothesis. Following the evidence from earlier research (see e.g. Loughran and Ritter, 2002; Hanley, 1993), the hypothesis is that there is a *positive relation between market returns and initial returns*.

4.5.2 *Firm and offering specific characteristics*

Many studies on initial public offerings have used firm and offering specific information that can be found in the prospectus to predict some IPO pricing related phenomenon. The most commonly predicted phenomena are long-run returns (see e.g. Jain and Kini, 2000; Hensler et al., 1997; Ritter, 1991) and first-day returns (see e.g. Ibbotson et al., 1988). Also survival of IPO firms has been studied by analysing the relation between offer specific factors and the IPO survival (see e.g. Bhabra and Pettway, 2003).

The range of factors used as indicators has been very wide. The characteristics used have included for example factors relating to *ownership* before and after the IPO (e.g. venture capital backing, founder ownership, equity retention of initial owners), *firm characteristics* (e.g. firm size, age, industry), *financial information* (e.g. profitability, earnings forecasts, financial leverage, level of R&D spending), *offering characteristics* (timing, offering size, reason for capital needs) and *parties involved* in the IPO (underwriter reputation, auditor quality). Common factor to all of these characteristics is that they in some way try to estimate the uncertainty relating to the IPO or the firm, which in turn affects the survival profile, level of underpricing or long-run performance. Since uncertainty cannot be observed, it needs to be proxied.

I have chosen seven firm and offering specific characteristics that I consider relevant in predicting the width of the offer price range and the price adjustment. All of these factors are set out in the prospectus and are commonly used in earlier IPO related studies in some context as independent variables associated positively or negatively with uncertainty regarding the firm value.

4.5.3 *Equity retention*

Signalling theory assumes that equity retention is positively related to firm value. Following earlier studies (see e.g. Keloharju and Kulp, 1996; Ljungqvist, 1997), I define the equity retention signal as the fraction of shares retained by the initial shareholders after the IPO, which is calculated as the number of the shares held by the original shareholders after the IPO divided by the total number of shares after the IPO. The fraction of shares retained by the initial owners depends on both how many shares are offered to the public and whether the shares offered are primary shares or secondary shares. If the proportion of secondary shares in the total offering is very high, the retention ratio is lower, respectively.

If signalling theory holds, the original shareholders can by retaining a significant proportion of the company's shares reduce investors' uncertainty of the value of the IPO. A larger management share ownership would imply lower uncertainty and therefore a narrower offer price range and less adjustment in offer price. Thus, equity retention is expected to be negatively related to the width of the offer price range and price adjustment.

4.5.4 *Executive ownership*

Management ownership has been anticipated to reduce the agency problems between the owners and the management and therefore to be associated with higher firm value (see e.g. Ritter, 1984; Keloharju and Kulp, 1996). It is assumed that management ownership reduces the uncertainty regarding the IPO value. Hence, executive ownership is expected to have negative relation to the width of the price range and price revisions. Executive ownership is defined in this study as the number of shares held by the board and the operating management of the firm before the IPO to the total number of shares.

4.5.5 *Venture capitalist ownership*

Certification theory is tested by analysing the effect of venture capitalist ownership of the firm on the offer price range. Venture capitalist involvement is easier to test than for example underwriter prestige, as investment bank rankings are not as established in the Finnish IPO market as in the US due to the small size of the market. Venture capitalist involvement is calculated as the percentage of the shares held by venture capitalist companies prior to the IPO.

The higher the share of the venture capitalists in the firm's equity, the stronger signal it is supposed to send to investors regarding the value of the offering. This should also lead to a narrower price range and less adjustment of the offer price due to the reduced uncertainty. Therefore a negative relationship is assumed between the venture capitalists' ownership percentage and the width of the offer price range or the price adjustment.

4.5.6 *Offering size*

The inverse of the offering size has been widely used as a proxy for the uncertainty relating to the value of the share, and it has been empirically found that smaller offerings are on average more speculative than larger offerings (see e.g. Beatty and Ritter, 1986; Hanley, 1993; Ljungqvist, 1997). Hanley (1993) used offering size as a proxy for the uncertainty regarding the IPO value when analysing the determinants of revisions in offer prices.

The impact of offering size is measured by taking the natural logarithm of the offering proceeds. The anticipated offering proceeds are calculated as the midpoint of the offer price range times the number of the shares offered in the offering, excluding over-allotment options granted to underwriters. I use the midpoint of the range as the multiplier instead of the final offer price, as the final offer price is not known when the initial offer price range is set.

4.5.7 *Company age*

The age of the company has been used as a proxy for the risk of the share issue in IPO related literature. Older firms are able to reduce information asymmetry between the investors and

the issuer by providing performance data over several years (Beatty and Ritter, 1986). A strong monotone relation has been documented both between the firm age and initial return and between the firm age and long-run performance (Ritter, 1991). Ritter found that older firms perform better in the long run than young firms, and Hensler et al. (1997) documented an increase in the survival time of IPOs with the age of the issuing firm.

Firm age is specified as the difference between the year of the offering and the founding year of the company. In case of IPOs of new spin-off companies, the founding year of the companies selling the shares in the new spin-off company has been used, as the business of these companies has been running for a longer period of time, even though the company may have been newly incorporated.

The younger the issuing firm, the more there is information asymmetry and uncertainty regarding the value of the issue. Therefore, the relation between firm age and width of the price range is expected to be negative as well as the relation between firm age and price adjustment.

4.5.8 Company size

The size of the company has been shown to reduce the uncertainty regarding the IPOs (see e.g. Schultz, 1993). Larger firms are better monitored than smaller ones, as they are likely to have more stakeholders that require information about the company. Furthermore, they have better access to investment capital and more diversified product lines, which reduces the risk relating to the IPOs of the larger firms (Bhabra and Pettway, 2003). Hensler et al. (1997) found also that the size of the IPO firm is positively related to its survival in the long run. Wu (2005) documented a negative relationship between firm size and initial returns of IPOs, indicating less uncertainty relating to the IPO.

Total assets of the firm has been widely used as a proxy for the firm size in IPO pricing related literature (see e.g. Lowry and Schwert, 2004; Wu, 2005). I measure firm size by the natural logarithm of total assets in the end of the last full financial year before the IPO.

Due to the lower uncertainty relating to larger firms, the offer price range should be narrower and price adjustments less remarkable. Firm size is therefore expected to be negatively related to range width and price adjustment.

4.5.9 Profitability

Profitability of the firm has generally been associated with lower uncertainty regarding its value. The profitability of the company prior to the IPO has been shown to be related to the future performance of the firm (Michaely and Shaw, 1995). Pre-IPO profitability of the firm should be associated with narrower range width (as hypothesized by Daily et al., 2005) and with lower degree of price adjustment. Profitability is measured by the ratio of EBITDA to total assets in the end of the latest full financial year before the IPO. The figures are taken from the prospectuses.

4.6 Control variables

In addition to the independent variables, I use three firm and offering specific factors as control variables in the analysis to ensure that the hypothesized relations are caused by the independent variables and not by other factors.

4.6.1 High technology industry

Firms operating within high technology industry are generally considered to be riskier than many traditional industry sectors. Share price volatilities are high in comparison with other industries, and Finnish stock markets experienced a rapid rise and fall of many high technology firms around year 2000 when the IT bubble burst. If the firm that offers its shares in the IPO operates within high technology industry, it is assumed to have a wider price range (as shown by Daily et al., 2005) and more adjustment in the final price in relation to the range midpoint. Industry is included in the test as a dummy variable by marking firms operating in high technology sectors with 1 and other firms with 0.

4.6.2 *Board size*

Board size has been used as a proxy for uncertainty regarding the firm value (see e.g. Daily et al., 2005). Higher number of board members should be associated with lower risk relating to the company. However, this proxy is at least in Finnish context not very reliable proxy for uncertainty and is therefore included only as a control variable.

Board size is measured by calculating the number of board members of the firm. When the number of board members is announced in the prospectus both before and after the IPO, the post-IPO number has been used, as it can be considered to have more impact on the firm value in the future.

4.6.3 *Risk factors*

The number of risk factors listed in the prospectus has been used as an indicator of the uncertainty regarding the value of the issuer (see e.g. Bhabra and Pettway, 2003; Hensler et al., 1997). The higher the number of risk factors, the riskier is the issue. Hensler et al. found that the survival time of the firms conducting IPOs decreases with number of risk factors set out in the prospectus.

The number of risk factors is calculated from the prospectuses where the risk factors have been set out as a separate section. As the number of risk factors set out in the prospectus has increased over time in Finland due to changes in the drafting practice of prospectuses, it is not a very reliable measure of uncertainty and therefore included in the regressions as a control variable only.

Table 1 presents the variables used in this study and their definitions, and Table 2 summarises the hypothesized relationships to be tested with regression analysis.

Table 1 Summary of variables used in the regression analysis

Variable and code	Definition
Percent width of offer price range (<i>RANGE</i>)	(upper limit – lower limit) / midpoint of the offer price range
Price adjustment (<i>PRICE ADJUST</i>)	Percentage change between the midpoint of the offer price range and the final offer price
Absolute price adjustment (<i>ABS PRICE ADJUST</i>)	Percentage change between the midpoint of the offer price range and the final offer price in absolute terms
Initial returns (<i>IR</i>)	LN (first day closing price) – LN (offer price)
Market index before setting initial range (<i>OMXHCAP -90</i>)	LN (OMXHCAP index value at 90 days before the prospectus date) – LN (OMXHCAP index value at the prospectus date)
Market index during filing period, i.e. before setting final price (<i>OMXHCAP FILING</i>)	LN (OMXHCAP index value at 15 days before the listing date) – LN (OMXHCAP index value at 1 day before the listing date)
Equity retention (<i>RETENTION</i>)	Fraction of shares retained by the original shareholders after IPO
Executive ownership (<i>EXEC OWN</i>)	Executive stock ownership percentage before IPO
VC ownership (<i>VC</i>)	Proportion of shares held by venture capitalists before IPO
Offering size (<i>OFFERING SIZE</i>)	LN (midpoint of the offer price range times the number of shares offered excluding the over-allotment option)
Firm age (<i>FIRM AGE</i>)	Difference between the year of the offering and the founding year of the firm
Firm size (<i>FIRM SIZE</i>)	Logarithm of the total assets of the company in the end of the financial year before IPO
Profitability (<i>EBITDA / ASSETS</i>)	EBITDA/ASSETS for the financial year before IPO
High technology industry (<i>HIGH TECH</i>)	Dummy variable: marked with 1 if the company operates within high technology industry, 0 otherwise
Board size (<i>BOARD SIZE</i>)	Number of board members (after IPO if specified)
Risk factors (<i>RISK FACTORS</i>)	Number of risk factors set out in the prospectus

Table 2 Summary of hypotheses to be tested with regression analysis

The table summarises the hypotheses for the regression models to be used in the analysis of the relations between various independent variables and the width of the offer price range, price adjustment and initial returns.

	Range width	Price adjustment	Initial returns
Price adjustment			+
Range width		+	
Market returns before prospectus date	-	+	+
Market returns during filing period		+	+
Equity retention	-	-	
Executive share ownership	-	-	
Venture capitalist ownership	-	-	
Offering size	-	-	
Firm age	-	-	
Firm size	-	-	
Pre-IPO Profitability	-	-	
Board size	-	-	
High technology industry dummy	+	+	
Number of risk factors in the prospectus	+	+	

5 Results

5.1 Descriptive statistics

This section focuses on analysing and describing the characteristics of initial offer price ranges and its relation to the final offer price and the first-day closing price in Finnish IPOs in comparison with international studies. Table 3 presents statistics for the range width and differences between the midpoint of the range, the final offer price and the first-day closing price in the IPO sample.

Table 3 Descriptive statistics for offer price range

The table presents information about the initial offer price range, the final offer price and their relation to the first-day closing price for a sample of 45 Finnish IPOs conducted between 1995 and 2006. The *width of the offer range* is measured as (high bound of the range – low bound of the range) / range midpoint. *Price adjustment* is the percentage difference between the final offer price and the range midpoint, and *absolute price adjustment* gives the difference in absolute terms. *Initial returns* are calculated as the difference between the logarithmic values of the first-day closing price and the final offer price. *IR relative to range midpoint* refers to the percentage difference between the first-day closing price and the midpoint of the initial range.

	Mean	Median	Std deviation	Min	Max
<i>Range width in %</i>	16,7 %	16,7 %	4,4 %	7,4 %	26,7 %
<i>Range width in €</i>	1,47 €	1,30 €	0,77 €	0,40 €	4,00 €
<i>Price adjustment</i>	0,6 %	3,7 %	14,7 %	-68,2 %	25,0 %
<i>Absolute price adjustment</i>	9,4 %	6,9 %	11,2 %	0,0 %	68,2 %
<i>Initial returns</i>	15,2 %	5,0 %	46,8 %	-30,6 %	242,9 %
<i>IR relative to range midpoint</i>	18,3 %	5,6 %	59,6 %	-77,9 %	278,0 %

5.1.1 Width of offer price range

Table 3 shows that the average percentage width of the offer price range in the sample was 16.7 percent. The result is in line with earlier literature. Jenkinson et al. (2006) found similar average range width (16.4%) for their sample of 740 European IPOs between January 1994 and July 1999, and the average range width for the 2,930 US IPOs during the same period was 15.2%. Hanley (1993) documented an average range width of approximately 15% in her

sample of 1,430 IPOs in the US between January 1983 and September 1987. However, the width was calculated in her study from the lower bound of the range, not from the midpoint.

The maximum and minimum percentage widths were 7.4% and 26.7%, and the standard deviation was 4.4%. The average width of the range in euros was € 1.47, and the median € 1.30. The narrowest range was € 0.40, and the widest € 4.00. The price data for 12 IPOs for which the data is available only in Finnish marks has been converted into euros.

Figure 4 presents the distribution of the percentage widths of offer price ranges among the IPO sample. The most common range was from 16% to 20% with 17 IPOs. Also ranges from 12% to 16% and from 20% to 24% were rather common. Most of the price ranges in the sample were between 8% and 24%, as only one IPO had a range narrower than 8%, and only two IPOs had a range wider than 24%.

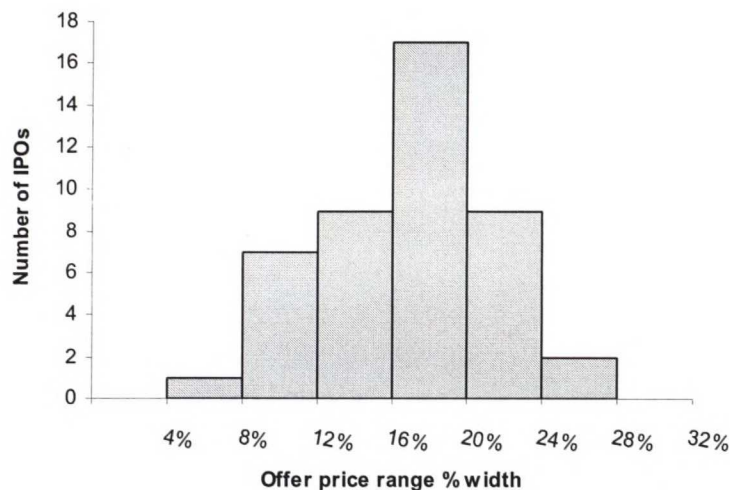


Figure 4 Distribution of the offer price range percentage widths

The figure presents the distribution of percentage widths of the offer price ranges, measured as (high-point – low-point) / midpoint. The sample consists of 45 Finnish IPOs between 1995 and 2006.

Figure 5 presents a histogram of the distribution of the offer price range widths in euros in 33 Finnish IPOs between 1999 and 2006. The IPOs with the pricing data in Finnish marks are

excluded from the histogram. The histogram shows that there is no clear clustering of range widths to any single euro amount and that there is no convention in Finland with respect to a fixed euro width. There are six IPOs where the range is € 0.80, six IPOs with a € 2.00 range, five IPOs with a € 1.00 range, and four IPOs with a € 1.50 range. The result indicates that there is a tendency to set the range width to whole prices (e.g. one euro, one and a half euros, two euros).

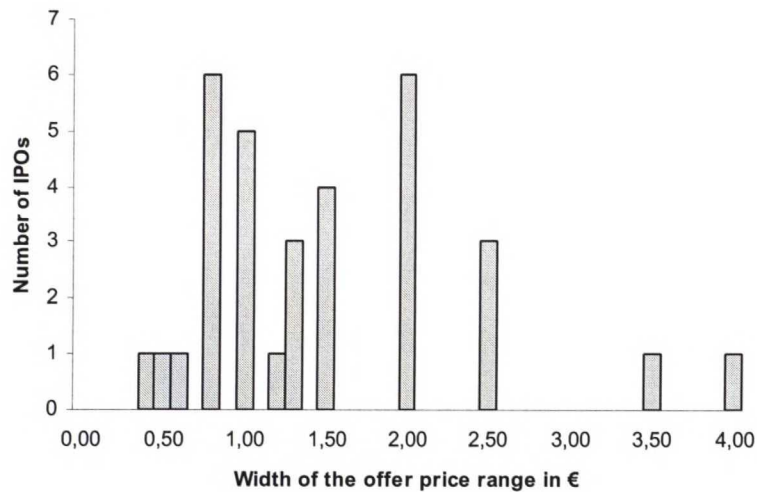


Figure 5 Distribution of the offer price range euro widths

The figure presents the distribution of the offer price range widths in euros in a sample of 33 Finnish IPOs between 1999 and 2006.

Jenkinson et al. (2006) noted that for European IPOs there is no consensus range, whereas in the US the range widths are determined on the basis of SEC guidance. The offer price range is set to \$2 in almost all US IPOs (Ritter, 2003). Similarly, the results now obtained from the Finnish IPO market indicate that there is no commonly agreed range as a percentage width or a euro width that would be applied in offerings independent of different IPO characteristics, but that offer price ranges vary significantly. Therefore analysing the width of the offer range is relevant in the context of IPO pricing in Finland, and testing the impact of various factors on the width of the range may shed more light on the pricing process.

Table 4 shows a comparison of range widths between IPOs that took place in 1999 and 2000 and IPOs conducted during years 1995-1998 and 2001-2006. The Finnish IPO market witnessed 25 IPOs from 1999 to 2000, whereas there were only 20 IPOs during the other years included in the sample. Even though the IPO market was hot in those two years, the offer price ranges were not any wider. The average range width for IPOs in 1999-2000 was 16.2%, which is somewhat below the average of IPOs during other years (17.3%).

Offerings with low offer prices had slightly wider offer price ranges than offerings with high offer prices per share, but the difference is not remarkable. The average width for IPOs with an offer price range midpoint below or at the median range midpoint of € 8.24 was 17.3%, whereas the average range width for IPOs with a range midpoint above the median was 16.0%.

Table 4 Width of offer price range with respect to offering year and offer price per share

The table presents a comparison of offer price range widths for a sample of 45 Finnish IPOs between 1995 and 2006. The *width of the offer range* is measured as (high bound of the range – low bound of the range) / range midpoint. The first two rows of the table show descriptive statistics for range widths in IPOs conducted during the hot IPO market years in Finland (1999-2000) and during other years included in the sample (1995-1998, 2001-2006). The last two rows present descriptive statistics for range widths in IPOs where the midpoint of the range was below or at the median range midpoint of the sample (€ 8.24) and in IPOs with a range midpoint above the median.

Range width in %	Observations	Mean	Median	Std deviation	Min	Max
<i>IPOs in 1999-2000</i>	25	16,2 %	16,2 %	4,6 %	8,2 %	26,7 %
<i>IPOs in 1995-1998, 2001-2006</i>	20	17,3 %	17,5 %	4,3 %	7,4 %	25,5 %
<i>IPOs with low share values</i>	23	17,3 %	17,1 %	4,5 %	9,1 %	26,7 %
<i>IPOs with high share values</i>	22	16,0 %	16,3 %	4,4 %	7,4 %	25,5 %

5.1.2 Price adjustment

Table 3 shows that the average price adjustment from the midpoint of the initial offer price range to the final offer price was only 0.6%, and the median 3.7%. The largest negative price revision in the sample was -68.2%, whereas the highest adjustment was 25%. The standard deviation was relatively high, 14.7%, which indicates that the price adjustments vary significantly. The average is lower than the median because of a few IPOs where the price

was adjusted downwards remarkably. The average price adjustments in earlier studies are summarised in Table 5. Hanley (1993) documented an average price update of negative 4.3% in her sample of 1,430 IPOs issued from January 1983 to September 1987. The median revision in the offer price was zero. Lowry and Schwert (2004) found that the final offer price was on average 1.4% below the midpoint of the offer price range. Jenkinson et al. (2006) documented an average price update of 3.3% for European and 2.5% for American IPOs between January 1994 and July 1999. The results from the US appear to indicate that average price adjustment has moved from negative figure of 1980's to above zero in the 1990's. The results from the Finnish market documented in this study are close to the findings documented by Jenkinson et al. (2006) for European IPOs.

Table 5 Summary of documented average price adjustments in earlier studies

The table presents the results of earlier studies investigating price adjustment. Average price adjustment measures the change in the final offer price compared to the midpoint of the initial offer price range and is calculated as $(P_O - P_E) / P_E$, where P_O is the final offer price and P_E is the midpoint of the range.

Research	Sample	Price adjustment
Hanley (1993)	1,430 IPOs in the US between January 1983 and September 1987	- 4.3%
Lowry and Schwert (2004)	3,878 IPOs in the US in 1985-1997	- 1.4%
Jenkinson et. al (2006)	740 European IPOs between January 1994 and July 1999	3.3%
Jenkinson et. al (2006)	2,930 IPOs in the US between January 1994 and July 1999	2.5%

What does an adjustment of the offer price from the midpoint of the offer price range indicate? Firstly, it can imply that new information is received during book building, and the offer price is adjusted on that basis. A large price adjustment is a signal of high uncertainty regarding the true value of the issue, which makes pricing of the issue more difficult for underwriters and issuing firm.

If the IPO pricing process is not efficient, a large price adjustment can also indicate that the initial offer price range was not set to an optimal level in the first place with respect to the market demand, whereas a small adjustment in price would be a signal of accurate pricing already at the stage of setting of the initial range. A large adjustment can also be interpreted as Lowry and Schwert (2004), who proposed that underwriters set the offer price range to a conservative level in case of risky IPOs, which then causes higher upward price adjustments.

Table 6 presents price adjustment statistics for IPOs in 1999 and 2000 and for IPOs occurred during the other years of the sample period of 1995-2006. The analysis shows that there was more adjustment between the range midpoint and the final offer price in IPOs that took place during the hot IPO years 1999 and 2000 than in other years, when excluding one IPO with an exceptionally high negative price adjustment (68%) in 2002 from the analysis. The average price adjustment in 1999-2000 was 8.9%, whereas the average during the other years was 7.1% for the adjusted sample (10.1% if not adjusting the sample). The result indicates that there was somewhat more uncertainty regarding the offer prices during the active IPO years of 1999 and 2000.

Table 6 Price adjustment with respect to offering year

The table presents a comparison of price adjustments with respect to the offering year for a sample of 45 Finnish IPOs between 1995 and 2006. *Absolute price adjustment* is the percentage difference between the final offer price and the midpoint of the offer price range in absolute terms. The first two rows of the table show descriptive statistics for price adjustments in IPOs conducted during the hot IPO market years in Finland (1999-2000) and during other years included in the sample (1995-1998, 2001-2006). The last row presents descriptive statistics for price adjustments for the latter group excluding one observation with an exceptionally high price adjustment.

Abs. price adjustment %	Observations	Mean	Median	Std deviation	Min	Max
<i>IPOs in 1999-2000</i>	25	8,9 %	6,9 %	7,6 %	0,0 %	26,3 %
<i>IPOs in 1995-1998, 2001-2006</i>	20	10,1 %	7,2 %	14,7 %	0,0 %	68,2 %
<i>IPOs in 1995-1998, 2001-2006, excl. 1 observation</i>	19	7,1 %	6,7 %	5,7 %	0,0 %	25,0 %

5.1.3 Price range accuracy

Absolute price adjustment describes how far from the range midpoint the final offer price is. Table 3 shows that the final offer price differs from the range midpoint 9.4% on average, whereas the median is somewhat lower, 6.9%. In this light it seems that the midpoint of the initial offer price range generally predicts the final offer price in a relatively accurate manner in Finland. Table 7 presents the distribution of price adjustments in the IPO sample. In 71% of the IPOs the final offer price differs from the range midpoint less than ten percent and in one third of the IPOs less than five percent. Only eight IPOs had a positive price adjustment of more than ten percent, and only five had a negative adjustment of over ten percent.

Table 7 Distribution of the price adjustment in the sample

The table presents the price revisions in the sample of 45 Finnish IPOs between 1995 and 2006. The price adjustment is calculated as the percentage difference between the final offer price and the range midpoint, and the absolute price adjustment measures the same in absolute terms. The first panel categorises the IPOs based on the level of price adjustment, whereas the second panel describes the distance of the final offer price from the range midpoint.

<i>Price adjustment</i>	over -10%	-10% to 0%	0% to 10%	over 10%
Number of IPOs	5	11	21	8
Proportion of IPOs	11,1 %	24,4 %	46,7 %	17,8 %
<i>Absolute price adjustment</i>	> 5%	5% - 10%	10% - 20%	over 20%
Number of IPOs	15	17	7	6
Proportion of IPOs	33,3 %	37,8 %	15,6 %	13,3 %

The accuracy of the initial offer price range can also be measured by calculating the difference between the first-day closing price of the stock and the midpoint of the offer price range. It indicates whether the offer price range was at the right level compared to the market price of the share observed after the IPO. As highlighted in Table 3, the average difference was 18.3%, which is significantly lower than the differences of 27.6% for European IPOs and 34.7% for US IPOs documented by Jenkinson et al. (2006). However, Jenkinson et al. analysed first-week closing price instead of first-day closing price, so the results are not fully comparable. In the sample used by Jenkinson et al., the German IPOs had a difference above 56%, which increased the respective figure for whole Europe remarkably, as the German IPOs

accounted for almost one third of the European IPOs in the sample. If Germany is excluded, the average difference between the closing price and the range midpoint was 15.1%. The level of the Finnish offer price ranges reflect the true market price therefore more accurately than the ranges in the US or in Germany, and are approximately as accurate as in many other European countries such as France, Belgium and the Netherlands (see Jenkinson et al., 2006).

5.1.4 Initial returns

First-day returns of the IPOs were 15.2% on average, which is somewhat higher than the initial returns of Finnish IPOs in the 1980's (8.7%) documented by Keloharju (1993).¹¹ Ritter and Welch (2002) found an average initial return of 18.8 percent in their sample of 6,249 U.S. IPOs between 1980 and 2001. Median initial returns in this study were moderate five percent. The sample average is increased by a couple of hot IPOs during the IT boom where the first-day returns exceeded 100%.

5.1.5 Offer price with respect to upper and lower limit of range

Table 8 shows the distribution of final offer prices within the sample with respect to the initial offer price ranges. In general, the final offer prices of most Finnish IPOs remain within the initial range, as only six IPOs were finally priced outside the range. 40% of IPOs were priced at the higher bound of the initial range. Pricing the issues at the high end of the range is a common phenomenon in Europe. Jenkinson et al. (2006) found that 46.6% of European IPOs in their sample were priced at the high-point of the range. Even though the results from Germany where almost 72% of the offerings are priced at the higher limit have a strong impact on the overall European results, also in most other European countries the proportion of offerings price at the high-point clearly exceeds the figure observed with the data from the

¹¹ Keloharju (1993) used a more sophisticated method of calculating initial returns, but as this study is focused more on initial offer range than underpricing, a simpler method is applied. The results are not therefore fully comparable.

US. In the US, only 19.4% of the final offer prices were set to the higher bound, but the final offer price exceeded the limit of the range much more often than in Europe.

Table 8 Distribution of final offer prices compared to initial offer price range

This table presents the distribution of the sample of 45 Finnish IPOs during 1995 – 2006 comparing the final offer price to the initial offer price range.

<i>Offer price relative to price range</i>	below	at lower bound	within	at higher bound	above
Number of IPOs	4	5	16	18	2
Proportion of IPOs	8,9 %	11,1 %	35,6 %	40,0 %	4,4 %

According to Jenkinson et al. (2006), this pattern results from institutional differences in the IPO process. In Europe, underwriters are able to exchange information about the demand and the pricing of the issue more freely with investors before the prospectus is filed. As a result of the information exchange, the offer price range can be set more accurately. The issuers and underwriters in Europe must commit to the initial range to be able to obtain private information from investors before setting the range. The results from Finnish IPOs are in line with the results from other European countries gathered by Jenkinson et al. The limits of the offer price range are not easily exceeded, and the final offer price often tends to lie at the high-point of the range.

Another reason for the companies to avoid exceeding bounds of the range in Finland is that investors have a possibility to cancel their subscriptions in the offering if the limits are exceeded, which creates a risk factor to the issuing firm. However, as the risk can be avoided by amending the initial offer price range before setting the final offer price, it is not likely to explain the phenomenon to full extent.

5.1.6 Statistics for independent variables

Table 9 presents the descriptive statistics of the other variables included in the regression. Below some interesting findings that are able to describe the characteristics of the IPO sample are highlighted.

The average retention percentage in the sample IPOs was 68.2%, which means that after IPOs the original shareholders still held over two thirds of the companies' shares. Venture capitalists owned on average 16.5% of the firms conducting IPOs. However, the median is zero, as there have been more IPOs without VC participation than IPOs with venture capitalists. The maximum venture capitalist ownership in the sample was 95%. Executives owned before the IPO on average 27 percent of the firm's shares. The mean company age at the IPO year was slightly over 26 years, the youngest firm being 1 year and the oldest 127 years. As discussed earlier, over one half of the sample consisted of high technology firm IPOs.

Table 9 Descriptive statistics for independent and control variables

The table presents descriptive statistics for the independent and control variables in a sample of 45 Finnish IPOs between 1995 and 2006. *OMXHCAP -90* is the difference in the logarithmic values of OMXHCAP index at 90 days before the prospectus filing date and at the prospectus date; *OMXHCAP FILING* is the difference of the logarithmic values of OMXHCAP index at 15 days before the listing date and at one day before the listing date; *RETENTION* is the fraction of equity retained by initial owners after IPO; *EXEC OWN* is the proportion of shares owned by firm's executives before IPO; *VC* is the proportion of shares owned by venture capitalists before IPO; *OFFERING SIZE* is the logarithmic value of the midpoint of the initial range times the shares offered; *FIRM AGE* is the difference between IPO year and founding year; *ASSETS* is the logarithmic value of total assets in €m in the end of the last full financial year before IPO; *EBITDA / ASSETS* is the ratio of EBITDA to assets in the end of the last full financial year before IPO; *BOARD SIZE* is the number of board members; *HIGH TECH* is a dummy variable that obtains the value one if the firm operates within high technology industry and zero otherwise; and *RISK FACTORS* is the number of risk factors set out in the prospectus.

Variable	Mean	Median	Std deviation	Min	Max
<i>OMXHCAP -90</i>	4,0 %	4,7 %	13,4 %	-29,8 %	35,6 %
<i>OMXHCAP FILING</i>	-0,3 %	-0,7 %	4,2 %	-9,6 %	13,3 %
<i>RETENTION</i>	68,2 %	70,3 %	15,1 %	20,0 %	99,7 %
<i>EXEC OWN</i>	27,0 %	14,1 %	32,1 %	0,0 %	100,0 %
<i>VC</i>	16,5 %	0,0 %	29,0 %	0,0 %	95,0 %
<i>OFFERING SIZE</i>	3,8	3,8	1,5	-2,1	6,9
<i>FIRM AGE</i>	26,3	15,0	29,9	1,0	127,0
<i>ASSETS</i>	3,8	3,2	2,0	0,1	8,7
<i>EBITDA / ASSETS</i>	17,4 %	17,1 %	16,5 %	-48,6 %	55,9 %
<i>BOARD SIZE</i>	5,6	5,0	1,4	3,0	9,0
<i>HIGH TECH</i>	55,6 %	100,0 %	50,3 %	0,0 %	100,0 %
<i>RISK FACTORS</i>	14,6	15,0	6,1	0,0	30,0

5.2 Correlation

Correlation matrix (Table 10) shows that some of the independent and control variables used in the analysis are highly correlated. *Venture capitalist ownership* is negatively correlated with *equity retention*. The correlation is significant at the 0.01 level. This seems logical, as venture capitalists usually try to exit from their investment at the IPO stage and move on to the next potential investment target. Venture capitalists do not usually prefer staying as shareholders after the IPO, however lock-up period restrictions often prevent VCs to fully exit the investment immediately after the IPO. Negative correlation between firm's *profitability* and *VC involvement* is unexpected, as it would indicate that venture capitalist take public less profitable firms.

High technology dummy has negative correlation with several other variables due to the nature of high technology firms. Firms within technology industry are often rather young firms in comparison with other industries, which can be seen as a negative correlation between *firm age* and high technology dummy. The strong negative correlation between high technology industry and *total assets* is caused not only by the young age but also by the fact that high technology industry firms do not usually own many valuable tangible assets. As high technology firms tend to be smaller, their issues are likely to be smaller too. Therefore, the negative correlation with *offering size* is natural. Finally, high technology dummy is positively correlated with the *executive ownership*, so the management of technology firms appear to have more shareholdings in their companies.

There is significant positive correlation between the *firm age* and *assets*. Older firms have had time to grow their business and balance sheet, so this correlation is logical. This is also the reason for the positive correlation between *firm age* and *offering size*.

A strong positive correlation can be found between *offering size* and *firm size* measured by total assets, which is not surprising. Large companies tend to have more board members, which is evidenced by very significant positive correlation between *board size* and *assets*. This clarifies also the correlation between board size and offering size. Significant positive correlation between *offering size* and *number of risk factors* listed in the prospectus can be explained by the fact that larger offerings are often more carefully prepared by advisers with

high prestige, which is likely to result in longer prospectuses with a more extensive list of risk factors. This interpretation questions the validity of the risk factors as a proxy for firm value uncertainty.

Executive share ownership has significant negative correlation with *firm size*, *offering size*, and *number of board members*. This indicates that management owns a larger proportion of shares in small companies than in large firms that are going public. The positive correlation between *executive ownership* and firm's *profitability* is interesting, as it appears to propose that managers are doing better job if they have their own wealth at stake.

Table 10 Correlation matrix

The table shows the correlations between the independent and control variables used in the study. *OMXHCAP -90* is the difference in the logarithmic values of *OMXHCAP* index at 90 days before the prospectus filing date and at the prospectus date; *OMXHCAP FILING* is the difference of the logarithmic values of *OMXHCAP* index at 15 days before the listing date and at one day before the listing date; *RETENTION* is the fraction of equity retained by initial owners after IPO; *EXEC OWN* is the proportion of shares owned by firm's executives before IPO; *VC* is the proportion of shares owned by venture capitalists before IPO; *OFFERING SIZE* is logarithmic value of the midpoint of the initial range times the shares offered; *FIRM AGE* is the difference between IPO year and founding year; *ASSETS* is the logarithmic value of total assets in €m in the end of the last full financial year before IPO; *EBITDA / ASSETS* is the ratio of EBITDA to assets in the end of the last full financial year before IPO; *BOARD SIZE* is the number of board members; *HIGH TECH* is a dummy variable that obtains the value one if the firm operates within high technology industry and zero otherwise; and *RISK FACTORS* is the number of risk factors set out in the prospectus. Statistical significance is indicated at the 0.01 and 0.05 level with ** and *, respectively.

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1 OMXHCAP -90	1											
2 OMXHCAP FILING	-0,13	1										
3 RETENTION	-0,06	-0,03	1									
4 EXEC OWN	-0,01	0,18	0,07	1								
5 VC	-0,10	0,17	-0,45**	-0,24	1							
6 OFFERING SIZE	-0,08	0,00	-0,15	-0,52**	-0,09	1						
7 FIRM AGE	0,08	-0,04	-0,15	-0,13	-0,12	0,31*	1					
8 ASSETS	0,07	-0,18	0,02	-0,64**	-0,12	0,69**	0,48**	1				
9 EBITDA / ASSETS	0,26	-0,14	-0,17	0,36*	-0,31*	-0,09	0,01	-0,06	1			
10 BOARD SIZE	-0,07	0,20	-0,03	-0,45**	0,27	0,32*	0,28	0,38**	-0,19	1		
11 HIGH TECH	-0,15	0,12	0,15	0,41**	0,01	-0,45**	-0,30*	-0,63**	-0,02	-0,25	1	
12 RISK FACTORS	-0,02	0,15	-0,06	-0,09	0,10	0,34*	0,19	0,16	-0,13	0,01	-0,06	1

5.3 Regression analysis

5.3.1 *Regression models*

The relationship between the dependent and independent variables is tested with OLS regression analysis. Due to the limited sample size, all the variables cannot be inserted into the same regression model, but several regression models have to be constructed for each of the dependent variables. Significantly correlated independent and control variables identified in the correlation analysis (see Table 10) are excluded from the same models to avoid multicollinearity effects.

The coefficients of determination (adjusted R^2) are generally rather low in the regression models. However, this observation is not very relevant, as the purpose of the regression models in this study is to analyse the impact of the independent variables to the dependent variables rather than to form comprehensive models explaining the dependent variables.

Below I report the most important findings of the analysis and present the results of some of the regression models constructed for the analysis.

5.3.2 *Width of offer price range*

Table 11 reports results of OLS regressions for the percentage width of the offer price range against the independent and control variables. Four different regression models are shown representing the most interesting results obtained from the analysis. Each of the independent variables is included in at least one of the models shown in Table 11.

Table 11 OLS regression results for the width of the offer price range

The table presents OLS regressions with percentage width of the offer price range as the dependent variable for a sample of 45 Finnish IPOs between 1995 and 2006. The independent variables are the following: *OMXHCAP - 90* is the difference in the logarithmic values of OMXHCAP index at 90 days before the prospectus filing date and at the prospectus date; *RETENTION* is the fraction of equity retained by initial owners after IPO; *EXEC OWN* is the proportion of shares owned by firm's executives before IPO; *VC* is the proportion of shares owned by venture capitalists before IPO; *OFFERING SIZE* is the logarithmic value of the midpoint of the initial range times the shares offered; *FIRM AGE* is the difference between IPO year and founding year; *ASSETS* is the logarithmic value of total assets in €m in the end of the last full financial year before IPO; *EBITDA / ASSETS* is the ratio of EBITDA to assets in the end of the last full financial year before IPO; *BOARD SIZE* is the number of board members; *HIGH TECH* is a dummy variable that obtains the value one if the firm operates within high technology industry and zero otherwise; and *RISK FACTORS* is the number of risk factors set out in the prospectus. T-statistics are in brackets. Statistical significance at the 0.01, 0.05, and 0.10 level is indicated with ***, **, and *, respectively.

Variable	Predicted sign	(1)	(2)	(3)	(4)
Intercept		0,156 (8,973)	0,170 (5,010)	0,128 (4,036)	0,135 (6,726)
<i>OMXHCAP - 90</i>	-	-0,077 (-1,713)*	-0,068 (-1,374)	-0,062 (-1,219)	-0,051 (-1,068)
<i>RETENTION</i>	-		-0,026 (-0,594)		
<i>EXEC OWN</i>	-	-0,044 (-2,332)**			
<i>VC</i>	-			-0,014 (-0,569)	-0,007 (-0,306)
<i>OFFERING SIZE</i>	-				0,011 2,737***
<i>FIRM AGE</i>	-	0,000 (1,289)			
<i>ASSETS</i>	-		0,006 (2,019)**		
<i>EBITDA / ASSETS</i>	-		-0,043 (-1,066)		-0,042 (-1,041)
<i>BOARD SIZE</i>	-			0,006 (1,211)	
<i>HIGH TECH</i>	+			0,017 (1,234)	
<i>RISK FACTORS</i>	+	0,001 (1,294)			
Observations		45	45	45	45
Adjusted R ²		0,181	0,086	0,014	0,153

A negative relation was found between the width of the range and executive ownership in the issuing companies. The relation is statistically significant, as the p-value for the coefficient is 0.025. The result appears to be consistent with the agency hypothesis (Ritter, 1984), which predicts that an increase in ownership of managers reduces agency problems between owners and managers and therefore increases the firm value. Keloharju and Kulp (1996) analysed a sample of 60 Finnish IPOs and found a positive relation between the firm value and the management ownership supporting the agency hypothesis at low ownership levels, whereas the relation was not significant at high ownership levels. In the context of initial offer price ranges it can be interpreted that the uncertainty regarding the firm value is reduced, if the conflict of interest between the executives and the future owners (investors participating in the IPO) is lower due to the higher share ownership by the managers and board members. Hence, the range width is narrower than in offerings where the executives own smaller share of firm's equity.

Statistically significant relations were identified with firm size and offering size variables at the 0.05 and 0.01 levels, respectively. However, instead of the expected negative relation with the range width, the coefficients for total assets and anticipated offering proceeds were positive. Firm size and offering size were assumed to be associated with lower uncertainty regarding the value of the issue and hence the narrower range width, but the results clearly reject the hypothesis.

The assumption that firm size reduces the uncertainty relating to the firm has received support in the earlier research, as it has been found that company size is positively related to the long run survival of the firm (Hensler et al., 1997) and negatively related to initial returns (Wu, 2005). Daily et al. (2005) studied the impact of firm size on the width of the range, but did not find significant evidence on the assumed negative relation between firm size and range width. The relation between offering size and range width has not been reported in earlier literature, but the inverse of offering size has been used as a proxy for uncertainty regarding the IPO value in many studies (see e.g. Hanley, 1993; Ljungqvist, 1997). Therefore, the results obtained regarding firm size and offering size are surprising and do not support the assumption that the width of the range is related to the uncertainty regarding the firm value.

Market conditions before the prospectus date were negatively related to the width of the offer price range as anticipated. However, the result is statistically significant only at the 0.10 level and only in some of the regression models, so the finding does not provide particularly strong support for the hypothesized negative relation. Also Jenkinson et al. (2006) investigated whether the level or recent volatility of local market indices affected the width of offer price ranges in European IPOs, but found no evidence on such relation.

Also some other assumed relations between the independent variables and the range width were identified, such as the negative impact of profitability to the range. However, none of the other variables included had a statistically significant impact on the width of the offer price range, so their anticipated effect on the range width does not receive support. Control variables did not have a statistically significant impact on the dependent variable.

5.3.3 *Price adjustment*

Table 12 presents the regression results for the models predicting price adjustment. The dependent variable in the regression models was the absolute change in the final offer price relative to the midpoint of the range, except for models analysing the market indices where the standard percentage price adjustment was used.

The explanatory power of market conditions was studied with two independent variables. Changes in the market index were analysed both for a 90 days' period before the prospectus date and for a period from 15 days before the listing date to one date before listing date, but neither of these proxies had a significant impact on the price adjustment.

The result regarding the changes in the market index during the filing period is somewhat surprising, as it is reasonable to assume that changes in the market conditions cause a respective change in the final offer price. Also earlier research has shown a significant relation between market returns before the IPO and price revisions with respect to the initial range. Hanley (1993) noted that changes in the market index during the filing period can predict price revisions, and also Loughran and Ritter (2002) found that price revisions are significantly related to market returns during 15 days before the offering.

Table 12 OLS regression results for the price adjustment

The table presents OLS regressions for a sample of 45 Finnish IPOs between 1995 and 2006 with the price adjustment as the dependent variable. *Price adjustment* is the percentage difference between the final offer price and the initial offer price range midpoint. In models 2 and 3 the dependent variable is in absolute terms. The independent variables are the following: *RANGE* is the percentage width of the offer price range; *OMXHCAP - 90* is the difference in the logarithmic values of OMXHCAP index at 90 days before the prospectus filing date and at the prospectus date; *OMXHCAP FILING* is the difference of the logarithmic values of OMXHCAP index at 15 days before the listing date and at one day before the listing date; *RETENTION* is the fraction of equity retained by initial owners after IPO; *EXEC OWN* is the proportion of shares owned by firm's executives before IPO; *VC* is the proportion of shares owned by venture capitalists before IPO; *OFFERING SIZE* is the logarithmic value of the midpoint of the initial range times the shares offered; *FIRM AGE* is the difference between IPO year and founding year; *ASSETS* is the logarithmic value of total assets in €m in the end of the last full financial year before IPO; *EBITDA / ASSETS* is the ratio of EBITDA to assets in the end of the last full financial year before IPO; *BOARD SIZE* is the number of board members; *HIGH TECH* is a dummy variable that obtains the value one if the firm operates within high technology industry and zero otherwise; and *RISK FACTORS* is the number of risk factors set out in the prospectus. T-statistics are in brackets. Statistical significance at 0.01, 0.05, and 0.10 level is indicated with ***, **, and *, respectively.

Variable	Predicted sign	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept		0,100 (1,510)			0,085 (1,463)	-0,141 (-1,578)	0,222 (4,377)	-0,014 (-0,126)
<i>RANGE</i>	+	-(0,035) -(0,090)						
<i>OMXHCAP -90</i>	+		0,054 (0,325)					
<i>OMXHCAP FILING</i>	+			-0,174 -(0,325)				
<i>RETENTION</i>	-					0,278 (2,556)**		0,276 (2,569)**
<i>EXEC OWN</i>	-					0,005 (0,102)		
<i>VC</i>	-				-0,118 (-1,924)*		-0,126 (-2,199)**	
<i>OFFERING SIZE</i>	-						-0,027 (-2,541)**	
<i>FIRM AGE</i>	-					0,000 (-0,094)		
<i>ASSETS</i>	-				-0,006 (-0,706)			
<i>EBITDA / ASSETS</i>	-				0,002 (0,017)		-0,037 (-0,372)	0,068 (0,694)
<i>BOARD SIZE</i>	-							-0,017 (-1,474)
<i>HIGH TECH</i>	+							0,009 (0,282)
<i>RISK FACTORS</i>	+				0,004 (1,257)	0,003 (1,158)		
Observations		45	45	45	45	45	45	45
Adjusted R ²		-0,023	-0,021	-0,021	0,028	0,080	0,143	0,129

Lowry and Schwert (2004) found that in addition to the positive effect of market returns during the filing period on the price adjustment, also market returns before the initial offer price range are significantly related to the price adjustment, which suggests that underwriters do not incorporate all the public information to the initial range. Similar conclusion cannot be drawn with respect to the Finnish IPO market on the basis of this analysis, as no evidence on the relationship between the market conditions before the IPO and price revisions was found.

Hanley (1993) used the range width as a proxy for the uncertainty regarding the IPO value when she analysed the determinants of revisions in offer prices and found that the wider the range, the greater is the absolute change in the final offer price. However, in Finnish IPO market the width of offer price range does not have a significant impact on the price adjustment. The finding is surprising, as a wider range would allow more adjustment within the offer price range. As shown by Jenkinson et al. (2006), in European IPOs the final offer price exceeds the limits of the initial range more seldom in comparison with IPOs in the US. As presented earlier, the offer price usually remains within the offer price range also in the Finnish IPOs. It would be therefore logical to assume that larger offer price revisions are associated with wider ranges especially in European IPOs. However, Jenkinson et al. (2006) showed that the average range width is only slightly higher in European IPOs (16.4%) than in US IPOs (15.2%).

Offering size is negatively related to the absolute price adjustment as expected. The finding is significant at the 0.05 level. In earlier studies Hanley (1993) found no statistically significant relation between the expected issue size and the absolute price adjustment, whereas Lowry and Schwert (2004) showed that proceeds filed and price adjustment are positively related in their sample. The result from this analysis could mean that underwriters set the initial offer price range at a more conservative level in case of small issues as proposed by Lowry and Schwert. Small offerings are generally considered riskier, and the inverse of the offering proceeds has commonly been associated with the uncertainty regarding the firm value (see e.g. Beatty and Ritter, 1986; Ljungqvist, 1997). As the measure for the price update in this analysis is in absolute terms, the results could be interpreted also in another way. The range for smaller offerings is not necessarily set at a lower level on purpose by the underwriters, but rather it is more difficult for them to set the range at a right level due to the uncertainty regarding the true value of the offering.

Venture capitalist ownership is significantly negatively related to the price adjustment in the models presented in Table 12 at the 0.05 and 0.10 levels. The results are consistent with the venture capitalist certification theory, even though the statistical significance of the findings is not very high. The involvement of venture capitalists reduces the uncertainty regarding the IPO value in investors' minds, and therefore the initial offer price range can be set to a suitable level. Hence, there is less need for adjustment in the offer price from the midpoint of the initial range. Earlier evidence regarding venture capitalist certification hypothesis is controversial. Megginson and Weiss (1991) found support for the venture capitalist certification theory, whereas Bradley and Jordan (2002) came to the opposite conclusion.

Equity retention has a positive and significant coefficient with the dependent variable at the 0.05 level. The result is against the hypothesis, as equity retention of the initial shareholders was anticipated to give a positive signal of the firm value to investors in accordance with the signalling hypothesis by Leland and Pyle (1977). The impact of equity retention rates on price update has not been studied earlier. Downes and Heinkel (1982) and Keloharju and Kulp (1996) found a positive relationship between the firm value and retention rates. In contrast, Bradley and Jordan (2002) and Ljungqvist (1997) showed that equity retention is positively related to initial returns, which speaks against signalling theory. The result now obtained is in line with the latter studies. Equity retention seems to increase the price revisions from the range midpoint, and it does not reduce the risk relating to the issue or help underwriters to set the initial offer price range at an appropriate level. A simple argument on behalf of signalling theory would be that equity retention reduces the risk relating to the issue causing therefore a higher increase in offer price. However, this interpretation is not correct, as the level of equity retention is already known when the initial range is set. The level of the range should therefore already reflect this information, and thus it should not cause a high price adjustment.

Other independent variables were not able to predict the price adjustment in a statistically significant manner. Control variables did not have significant impact on the dependent variable.

5.3.4 Initial returns and price adjustment

Table 13 presents the results for the regression models predicting initial returns. A significant positive relation is found between price adjustment and first-day returns with a p-value of as high as 0.003. This finding gives strong support to the partial adjustment hypothesis indicating that underwriters do not adjust the final offer price to full extent on the basis of the positive information learned during IPO process. It can be assumed that issuing firm and underwriters obtain additional information after the initial offer price range is set, but do not incorporate this information fully to the final offer price. A smaller increase in offer price in turn results in higher underpricing. Similar results have been documented earlier with data from the US. Hanley (1993) presented that price adjustment is positively related to initial returns and that offerings where the final offer price exceeds the upper limit of the initial range incur higher initial returns. Also Lowry and Schwert (2004) and Loughran and Ritter (2002) have shown that price adjustment has a positive impact on initial returns. The positive relation suggests that there is partial adjustment to (private and/or public) information received before the final price is set.

Table 13 OLS regression results for initial returns

The table presents OLS regressions for a sample of 45 Finnish IPOs between 1995 and 2006. The dependent variable is initial returns, calculated as the difference between the logarithmic values of the first-day closing price and the offer price. The independent variables are the following: *PRICE ADJUSTMENT* is the percentage difference between the final offer price and the initial offer price range midpoint; *OMXHCAP -90* is the difference in the logarithmic values of OMXHCAP index at 90 days before the prospectus filing date and at the prospectus date; *OMXHCAP FILING* is the difference of the logarithmic values of OMXHCAP index at 15 days before the listing date and at one day before the listing date. T-statistics are in brackets. Statistical significance at the 0.01, 0.05, and 0.10 level is indicated with ***, **, and *, respectively.

<i>Variable</i>	<i>Predicted sign</i>	(1)	(2)	(3)
Intercept		0,089 (2,392)	0,067 (1,632)	0,089 (2,213)
<i>PRICE ADJUSTMENT</i>	+	(0,821) (3,202)***		
<i>OMXHCAP -90</i>	+		0,683 (2,318)**	
<i>OMXHCAP FILING</i>	+			-1,577 -(1,621)
Observations		45	45	45
Adjusted R ²		0,174	0,090	0,036

According to the theory by Benveniste and Spindt (1989), the positive private information received from investors during book building cannot be fully incorporated into the final offer price, as the investors that have provided such information to the underwriters have to be rewarded for revealing information. Later on many studies have found that public information can explain initial returns, which is against the hypothesis by Benveniste and Spindt (see e.g. Loughran and Ritter, 2002; Kent, 2002; Lowry and Schwert, 2004). A positive relation between market returns before the IPO and first-day returns would suggest partial adjustment to public information.

However, market conditions during the filing period do not seem to be relevant for underpricing in the Finnish IPO market, as the percent difference between market index 15 days before the listing date and one day before the listing date does not have a statistically significant impact on initial returns. The result does not follow the results of recent IPO pricing related research. Hanley (1993) showed that the change in NASDAQ index between prospectus date and offer date is positively related to initial returns. Lowry and Schwert (2002) suggested in their study that initial returns are driven by the information that is learned during the registration period but only partially incorporated into the final offer price. In addition, Loughran and Ritter (2002) categorised IPOs by the market movement in the three weeks before the issue and documented average first-day returns of 10.0% following market declines, and average first-day returns of 18.5% when the market has risen by at least 2.0%.

In contrast, the percent difference between market index 90 days before the prospectus date and the prospectus date is positively related to initial returns. The finding is significant at the 0.05 level. It appears that investment bankers do not incorporate all market information available to them to the initial offer price range. The relation between market returns before the initial range is set and underpricing has not been documented earlier, but Daniel (2002) showed that initial returns are significantly related to three months' market returns before the IPO. Even though Daniel's study included therefore both market conditions before the prospectus date and between the prospectus date and listing date, his results are to some extent comparable with the results obtained with the Finnish data.

The finding is surprising, as information about the market conditions could be taken into account already when setting the initial offer price range. The prospect theory by Loughran

and Ritter (2002) proposes that issuers care about the change in their wealth rather than the level of wealth, and therefore they do not mind leaving money on the table as much when the value of the company and thus their wealth after the IPO is higher than they expected. However, the reference point to the issuers is the initial range, the level of which should be set on the basis of the information available at that time. Therefore, the prospect theory does not seem to explain the identified relation much better than the dynamic information acquisition hypothesis proposed by Benveniste and Spindt (1989). Daniel (2002) presented an alternative theory for the phenomenon, which is based on bargaining power of the issuers. If the issuing firms believe that hot IPO markets are particularly good time to go public due to high valuation of the firms within their industry, their bargaining power against underwriters and institutional investors may be weak. On the other hand, in a cold IPO market the cost of delay for the issuer is lower, and therefore its bargaining power stronger, as the firm can credibly threaten to postpone the issue. The theory may have merit in explaining the evidenced relation between market returns before prospectus filing and initial returns in the Finnish IPO market.

5.4 Summary and interpretation of results

There is no standard width of initial offer price ranges in Finland, which makes it worthwhile to study the determinants of the width of the offer price range. The range widths vary both with respect to the relative width and to the euro width. In the light of the results obtained with the regression models predicting the offer price range, it can be concluded that the width of the offer price range in Finnish IPOs cannot be explained very well with firm and offering specific characteristics that are generally associated with IPO value uncertainty. The anticipated negative relationship between the executive ownership and range width was documented, which supports the agency theory. IPOs with large firms and sizeable offerings are associated with wide offer price ranges, which is an unexpected result given the results in earlier research indicating a negative relation between the uncertainty regarding the firm value and offering and firm size. Market conditions before the prospectus date had a negative effect on the range width, but the statistical significance of the finding is not very high. Underwriters seem to consider firm and offering specific factors and market conditions to some extent when they are deciding the range width, but these factors do not appear to be crucial for their decision making.

The first stage of the IPO pricing process seems to be relatively efficient in Finland. The midpoint of the initial offer price range predicts the final offer price rather accurately, as the average price adjustment from the range midpoint is less than 10%. The average difference between the range midpoint and the first-day closing price is 18%, which follows the figures presented by Jenkinson et al. (2006) for European IPOs.

The final offer price rarely exceeds the limits of the initial offer price range in the IPO sample. The evidence supports the proposition by Jenkinson et al. (2006) that points out the institutional differences in the IPO markets in the US and in Europe. In European IPOs, information exchange between issuers and investors already before the initial offer price range is set provides the issuing firm with information about the appropriate price level, but also gives them pressure to commit to setting the final price within the initial range.

It seems that underwriters in Finland do not adjust the final offer price on the basis of the market information received during the filing period. Thus, a possible market upturn incurred just before the IPO would not increase the offer price and offerings taking place when the market conditions have turned positive would have higher underpricing in Finland than for example in the US, where price adjustment is related to market movements. However, no evidence on the relation between positive market returns during the filing period and initial returns was found, which reduces the significance of the identified inefficiency in the pricing process. Market conditions before the prospectus date do not explain the price update, which indicates that existing market information is already reflected in the level of the initial offer range.

Some firm and offering specific characteristics predict the price adjustment from the range midpoint to the offer price. A large size of the offering is associated with lower changes in the offer price as expected, and a negative relationship between venture capitalist ownership and price adjustment was found supporting the venture capitalist certification theory. Equity retention was found to be positively related to price revisions, so the signalling hypothesis is clearly rejected.

Evidence from regressions predicting initial returns provide strong statistical support for partial adjustment hypothesis in the Finnish IPO market. The adjustment in offer price from

the midpoint of the offer price range is positively related to underpricing. Contrary to recent IPO pricing related research, no partial adjustment to public information learned during the IPO process was identified, as there is no relation between market returns during the prospectus filing period and first-day returns. A positive relation between the market returns before the initial offer price range is set and initial returns is unexpected, as it seems to suggest that the initial offer price range is set without taking into consideration the market conditions. Bargain power hypothesis by Daniel (2002) may be a possible explanation for the phenomenon.

5.5 Reliability, validity and generalizability

Data quality affects the reliability of the analysis. As the data has mostly been gathered from prospectuses, the possible reliability problems with databases have been avoided. The quality of the prospectuses has clearly varied over time and depends on the size of the IPO. Most of the data collected from prospectuses is reliable, but some of the factors collected called for interpretation and judgment. Also the possibility of human errors is present when manually collecting information from prospectuses. The index data gathered from HEX / OMX data base is considered to be reliable.

Validity of the analysis depends on the factors chosen to explain the dependent variables. It is possible that all of the chosen independent and control variables are not associated with uncertainty regarding the IPO. Other possible variables indicating uncertainty of the IPO that could have been used in the analysis include for example leverage, level of R&D spending, or underwriter prestige. Also other proxies for certain firm and offering specific characteristics could have been chosen, such as sales or number of employees as a proxy for company's size. The proxies for the range width and the price adjustment are considered valid, as similar proxies have been used in earlier research. The absolute price adjustment in regressions with firm and offering specific variables provided a better measure for price revisions.

Generalizability of the results can be negatively affected by the large share of IPOs of high technology firms during the IPO bubble in 1999 and 2000 in the sample. As these issues are generally considered to be riskier, they may have significant impact on the analysis and potentially cause a bias towards more uncertainty in the Finnish IPOs. However, it also has to

be noted that there are relatively many technology firms listed in the Helsinki Stock Exchange. The small size of the sample and the Finnish IPO market in general limits the generalizability of the results in a wider context.

6 Conclusion

6.1 Subject of the study

This study analysed the IPO pricing process from a slightly different view than most of the earlier research relating to the IPO pricing. The focus was on how the initial offer price range in IPOs is determined and on the role of the range in the IPO pricing process. The paper studied the effect of market conditions and firm and offering specific characteristics on the width and the level of the initial offer price range. The width of the offer price range and the magnitude of the price adjustments from the range midpoint were expected to be affected by factors that generally indicate uncertainty regarding the value of the issue. Risky issues were assumed to have wide offer price ranges and large price revisions, and vice versa.

Also the efficiency of the IPO process is studied by analysing whether underwriters incorporate all public information available to them to the initial offer price range and the final offer price, and observing how well the range midpoint predicts the final offer price and the market price observed after the IPO. Following earlier research, the study tested whether partial adjustment phenomenon can be observed also in the Finnish IPO market.

The data consisted of a sample of 45 Finnish IPOs that had an initial offer price range and that occurred between January 1, 1995 and December 31, 2006. The characteristics of the offer price range were analysed with descriptive statistics, and the impact of various firm, offering and market related factors on the width of the offer price range, the price adjustment from the range midpoint to the final offer price, and initial returns was studied with ordinary least squares regression with multiple variables.

6.2 Main findings

The final offer price remains usually within the initial offer price range, which points out the significance of the width and the level of the initial range. The width of the offer price range varies, as no standard percentage or euro range is applied in Finland. The average percent width of the offer price range in the sample was 16.7 percent, and the maximum and minimum widths were 26.4% and 7.4%. As the range width varies, it is meaningful to analyse

what are the determinants of the range width and to assume that the range width is associated with the uncertainty regarding the value of the IPO.

Firm and offering specific characteristics that are generally associated with uncertainty do not predict the width of the offer price range particularly well. A significant relationship between executive ownership and width of the range was found, which supports the agency hypothesis by Ritter (1984). However, most of the chosen firm or offering specific factors do not have impact on the range width. Similarly, the assumption that market conditions would affect the range width did not receive very significant support. In this light it seems questionable whether the width of the range is related to the uncertainty of the IPO value. As the width of the offer price range is not determined by the Financial Supervision or a market convention, the question of what determines the width of the offer price range remains partly unanswered.

The midpoint of the range predicts the final offer price rather well in Finnish IPOs, as the final offer price differs from the range midpoint on average less than 10%. The average difference between the range midpoint and the first-day closing price is approximately 18%, which is comparable to many other European countries and significantly lower than in the US. The finding indicates that the pricing process in Finland is relatively efficient at the first stage when the initial offer price range is set. In 87% of the Finnish IPOs the final offer price remained within the offer price range, and 40% of the offerings in the sample were priced at the higher bound of the initial offer price range. The results support the conclusions by Jenkinson et al. (2006), who proposed that the limits of the offer price range are exceeded much more often in the US than in Europe due to institutional differences. As underwriters in Europe are able to exchange information with investors prior to setting the initial range, the midpoint of the range is a more accurate estimate of the market value in Europe than in the US. In response to the information received before the offer price range is set, a commitment to stay within the range is necessary causing the bias towards the high point of the range.

Market information available to underwriters before the level of the offer price range is decided is related to initial returns. The finding would imply that IPO pricing is inefficient, as the initial offer price range does not fully reflect the market information available at that time. However, as in Finland the difference between the midpoint of the range and the market price

observed after the IPO is still reasonably small, the practical significance of the finding is not remarkable.

Partial adjustment phenomenon can be identified also in the Finnish market, as the initial returns were found to be significantly and positively related to the price adjustment. This indicates that the final offer price is not fully adjusted on the basis of the positive information learned during book building, which results in higher underpricing. In contrast to the previous studies on the US market, underpricing was not found to be related to market returns during the filing period. Therefore, it seems that in Finland the final offer price is only partially adjusted to private information learned during the book building, and that investors are rewarded for the information with a higher level of underpricing.

As market conditions during the filing period do not have any significant impact on the change in the offer price, it appears that Finnish underwriters do not adjust the final offer price on the basis of the market information observed before the final offer price is decided. However, as the market conditions during the filing period were neither related to initial returns, the finding does not imply a clear inefficiency in pricing.

Some firm and offering specific characteristics were shown to predict the price adjustment from the range midpoint to the offer price. Large offering size is associated with small adjustments in the offer price as expected, and a negative relationship between venture capitalist ownership and price adjustment was found supporting the venture capitalist certification theory. It can be concluded that the adjustments in the offer price from the range midpoint are related to the uncertainty regarding the IPO value, and firm and offering specific characteristics predict to some extent the price adjustments.

6.3 Implications of the findings

Practical implications of the findings can be scrutinised from investors' point of view. A wide offer price range does not provide information about the uncertainty relating to the firm's value. The midpoint of the range is a relatively accurate indication of the market price of the issue. The underwriters do not seem to adjust the final offer price on the basis of the latest

market conditions, but no evidence of higher initial returns to investors resulting from it was found.

Even though the indicative offer price range is not binding, it is seldom exceeded in Finnish initial public offerings, and a relatively large share of IPOs is priced at the higher limit of the range. It seems that underwriters commit to some extent to setting the final offer price within the initial offer price range. In case of IPOs with much higher demand than expected, the tendency to set the price within the range can provide the investors with an opportunity to higher initial returns.

For management and arrangers the results imply that setting the initial offer price range is a very important stage of the IPO pricing, as the final offer price usually remains within the range. A wider range gives more flexibility in pricing, but too wide a range could result in losing credibility in investors' eyes.

The main implication of this study for future research is that initial offer price range has significance in the IPO pricing and that investigating offer price range may bring new views to the IPO pricing related research. The level of the range has to be set at an appropriate level, as large adjustments in the offer price from the range midpoint lead to more severe underpricing. As in many countries underwriters seem to be reluctant to exceed the limits of the range, the width of the offer price range is also important, especially if the demand for the offering turns out to be significantly higher than expected.

6.4 Suggestions for future research

This study has identified some factors that determine the level and the width of the offer price range, but the question of the determinants of the offer price range still remains partly unanswered. Especially the width of the offer price range in IPO markets without a standard range width provides a challenge for future research. Extending the analysis to several European countries and analysing the results in the light of the institutional setting of each country could provide some answers to the question.

One interesting aspect to the initial offer price range that I have excluded from this study is the amendments in the initial offer price range. Bradley and Jordan (2002) analysed the relation between the range amendments and underpricing. It could be interesting to study the reasons for and the implications of the range amendments more in detail.

A more comprehensive use of agency theories could also provide an alternative approach to studying the IPO pricing. Conflicting interests of shareholders, management, underwriters, and investors may play a role also when it comes to the offer price range. It could be worth analysing more thoroughly what the interests of different parties regarding the width or the level of the range are. Analysis of who benefits from a wide/narrow offer price range and from low/high level of range may open the door for new ideas explaining the offer price range.

The hypothesis of firm and offering specific factors affecting the width of the range should not be fully rejected. There are several other firm and offerings specific factors that could have impact on the range, such as financial variables (leverage, level of R&D spending etc.) and additional factors relating to the offering (timing, purpose of raising capital).

Appendix I: Offerings included in the sample

Company	Listing date
Rauma	27/06/1995
KCI Konecranes	27/03/1996
Nordic Aluminium	24/04/1997
Incap	05/05/1997
Kyro	09/06/1997
Jaakko Pöyry	02/12/1997
A-Rakennusmies / Ramirent	30/04/1998
Sponda	01/06/1998
JOT Automation Group / Elektrobit	15/09/1998
Sonera	10/11/1998
Rapala VMC	04/12/1998
Fortum	18/12/1998
Janton	11/03/1999
Marimekko	12/03/1999
Eimo A	23/03/1999
Technopolis	08/06/1999
Biohit B	18/06/1999
Sanitec	06/07/1999
Tieto-X	28/09/1999
Liinos / Visma	08/10/1999
Proha	15/10/1999
Aldata Solution	22/10/1999
Comptel	09/12/1999
Basware	29/02/2000
Satama Interactive	15/03/2000
Saunalahti / Jippii	10/04/2000
EQ Online	14/04/2000
Etteplan	27/04/2000
Tekla A	22/05/2000
Wecan Electronics / Scanfil	22/05/2000
locore	29/05/2000
Done	19/06/2000
Biotie	29/06/2000
Tecnomen	30/06/2000
Okmetic	03/07/2000
Vacon	14/12/2000
SSH Communications	20/12/2000
QPR	08/03/2002
Kemira GrowHow	14/10/2004
Neste Oil	18/04/2005
AffectoGenimap	27/05/2005
Salcomp	13/03/2006
Ahlstrom	14/03/2006
FIM	13/04/2006
Outokumpu Technology	10/10/2006

References

Literature:

Beatty, R., Ritter, J., 1986. Investment banking, reputation, and the underpricing of initial public offerings. *Journal of Financial Economics* 15, 213-232.

Benveniste, L., Spindt, P., 1989. How investment bankers determine the offer price and allocation of new issues. *Journal of Financial Economics* 24, 343-361.

Benveniste, L., Wilhelm, W., 1997. Initial public offerings: going by the book. *Journal of Applied Corporate Finance* 10, 98-108.

Bhabra, H., Pettway, R., 2003. IPO prospectus information and subsequent performance. *Financial Review* 38, 369-397.

Bradley, D., Jordan, B., 2002. Partial adjustment to public information and IPO underpricing. *Journal of Financial and Quantitative Analysis* 37, 595-616.

Brau, J., Fawcett, S., 2006. Initial public offerings: An analysis of theory and practice. *Journal of Finance* 61, 399-436.

Daily, C., Certo, T., Dalton D., 2005. Investment bankers and IPO pricing: Does prospectus information matter? *Journal of Business Venturing* 20, 93-111.

Daniel, K., 2002. Discussion of "Why don't issuers get upset about leaving money on the table in IPOs?". *Review of Financial Studies* 15, 445-454.

Downes, D., Heinkel, R., 1982. Signaling and the valuation of unseasoned new issues. *Journal of Finance* 37, 1-10.

- Edelen, R., Kadlec, G., 2005. Issuer surplus and the partial adjustment of IPO prices to public information. *Journal of Financial Economics* 77, 347-373.
- Hanley, K.W., 1993. The underpricing of initial public offerings and the partial adjustment phenomenon. *Journal of Financial Economics* 34, 231-250.
- Hensler, D., Rutherford R., Springer T., 1997. The survival of initial public offerings in the aftermarket. *Journal of Financial Research* 20, 93-110.
- Ibbotson, R., Sindelar, J., Ritter, J., 1994. The market's problems with the pricing of initial public offerings. *Journal of Applied Corporate Finance* 7, 66-74.
- Ibbotson, R., Sindelar, J., Ritter, J., 1988. Initial public offerings. *Journal of Applied Corporate Finance* 1, 37-45.
- Jain, B., Kini, O., 2000. Does the presence of venture capitalists improve the survival profile of IPO firms? *Journal of Business Finance & Accounting*, 27, 1139-1178.
- Jenkinson, T., Ljungqvist, A., 1996. Going public. The theory and evidence on how companies raise equity finance. Clarendon press, Oxford.
- Jenkinson, T., Morrison, A., Wilhelm, W., 2006. Why are European IPOs so rarely priced outside the indicative price range? *Journal of Financial Economics* 80, 185-209.
- Keloharju, M., 1993. The winner's curse, legal liability, and the long-run price performance of initial public offerings in Finland. *Journal of Financial Economics* 34, 251-277.
- Keloharju, M., Kulp, K., 1996. Market-to-book ratios, equity retention, and management ownership in Finnish initial public offerings. *Journal of Banking & Finance* 20, 1583-1599.
- Kim, M., Ritter, J., 1999. Valuing IPOs. *Journal of Financial Economics* 53, 409-437.

Leland, H., Pyle, D., 1977. Informational asymmetries, financial structure, and financial intermediation. *Journal of Finance* 32, 371-381.

Ljungqvist, A., 1997. Pricing initial public offerings: Further evidence from Germany. *European Economic Review* 41, 1309-1320.

Ljungqvist, A., Jenkinson, T., Wilhelm, W., 2003. Global integration in primary equity markets: the role of U.S. banks and U.S. investors. *Review of Financial Studies* 16, 63-99.

Loughran, T., Ritter J., 2002. Why don't issuers get upset about leaving money on the table in IPOs? *Review of Financial Studies* 15, 413-443.

Lowry, M., 2003. Why does IPO volume fluctuate so much? *Journal of Financial Economics* 67, 3-40.

Lowry, M., Schwert, G.W., 2004. Is the IPO pricing process efficient? *Journal of Financial Economics* 71, 3-26.

Lowry, M., Schwert, G.W., 2002. IPO market cycles: Bubbles or sequential learning? *Journal of Finance* 57, 1171-2001.

Lucas, D., McDonald, R. 1990. Equity issues and stock price dynamics. *Journal of Finance* 45, 1019-1043.

Meggison, W., Weiss, K., 1991. Venture capitalist certification in initial public offerings. *Journal of Finance* 46, 879-903.

Michaely, R., Shaw, W., 1995. Does the choice of auditor convey quality in an initial public offering? *Financial Management* 24, 15-32.

Michaely, R., Shaw, W., 1994. The pricing of initial public offerings: tests of adverse-selection and signaling theories. *Review of Financial Studies* 7, 279-319.

Pagano, M., Panetta, F., Zingales, L., 1998. Why do companies go public? An empirical analysis. *Journal of Finance* 53, 27-64.

Ritter, J., 2003. Differences between European and American IPO Markets. *European Financial Management* 9, 421-434.

Ritter, J., 1991. The long-run performance of initial public offerings. *Journal of Finance* 46, 3-27.

Ritter, J., 1984. Signaling and the valuation of unseasoned new issues: A comment. *Journal of Finance* 39, 1231-1237.

Ritter, J., Welch, I., 2002. A review of IPO activity, pricing, and allocations. *Journal of Finance* 57, p. 1795-1828.

Rock, K., 1986. Why new issues are underpriced? *Journal of Financial Economics* 15, 187-212.

Schultz, P., 1993. Unit initial public offerings. *Journal of Financial Economics* 34, 199-230.

Sherman, A., 2005. Global trends in IPO methods: Book building versus auctions with endogenous entry. *Journal of Financial Economics* 78, 615-649.

Sherman, A., 2000. IPOs and long-term relationships: an advantage of book building. *Review of Financial Studies* 13, 697-714.

Welch, I., 1992. Sequential sales, learning, and cascades. *Journal of Finance* 47, 695-732.

Wasserfallen, W. and Wittleder, C., 1994. Pricing initial public offerings: Evidence from Germany. *European Economic Review* 38, 1505-1517.

Wu, Congsheng, 2005. All initial public offerings (IPO's) are not created equal. *Journal of Business and Economic Studies* 11, 19-32.

Web pages:

Web site of the Finnish Financial Supervision (Rahoitustarkastus).

<http://www.rahoitustarkastus.fi/Fin/Listayhtiolle/Esitteet/>

Web site of the OMX Group (Nordic Exchange). <http://www.omxgroup.com>

Interviews:

Interview with Mr. Ville Kajala, Market Supervisor, Financial Supervision, 10th January 2007